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THE CONTINGENCY OF THE LAWS OF NATURE

BY

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Member of the Académie Française

AUTHORISED TRANSLATION BY

FRED ROTHWELL

"Εἶναι καὶ ἐνταῦθα θεούς."

ARISTOTLE, *De part. anim.*, i, 5.

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PREFACE

Mr Fred Rothwell, who has made a careful and elegant translation of several of my writings, now offers the English-speaking public a translation of the work entitled : *De la Contingence des Lois de la Nature.* May I be permitted to say, without false modesty, that when in 1874 I presented this thesis at the Sorbonne for my doctor's degree, I had no conception that it would create attention after so long an interval, all the more so as the idea I set forth at that time seemed paradoxical and very unlikely to be taken into consideration ? As it happens, this idea is now attracting the attention of philosophers in various countries, and, in spite of the important development of scientific philosophy that has since come about, it is regarded by benevolent critics as a question of the day. It may, then, be interesting to state what are the two leading thoughts of this work.

The first is that philosophy should not confine itself to going over and over again the philosophical concepts offered us by the systems of our predecessors with the object of defining and combining them in more or less novel fashion : a thing that happens too frequently in the case of German philosophers. Philosophy should

put itself in direct touch with the realities of nature and of life ; more particularly it should be grounded on the sciences, for these are the clearest and most faithful image we have of the aspect presented to us by these realities. It has been my endeavour to replace a philosophy essentially conceptual by one that is living and is moulded on reality.

In the second place, philosophical systems appeared to me as though they might be summed up, speaking generally, in three types, which all had the same drawback : the idealist, the materialist, and the dualist or parallelist types. These three points of view have this in common : they force us to regard the laws of nature as a chain of necessity, rendering illusory all life and liberty.

Analysing the notion of natural law, as seen in the sciences themselves, I found that this law is not a first principle but rather a result ; that life, feeling, and liberty are true and profound realities, whereas the relatively invariable and general forms apprehended by science are but the inadequate manifestation of these realities.

And so I have restored to man, *qua* man, to his thoughts and feelings, his will and action, that reality and affective influence over the course of things which common sense attributes to them, but which purely intellectualist or voluntarist philosophies, like those of Germany for the most part, declare to be inconceivable and illusory. Man is able to act on nature because nature

THE CONTINGENCY OF THE LAWS OF NATURE

INTRODUCTION

At his first appearance on this globe, man is wholly engrossed in the sensations of pleasure or pain that come to him ; he does not think of the outer world, does not even know of its existence. In time, however, through these very sensations, he distinguishes two elements : the one, relatively simple and uniform, is the sense of self ; the other, more complex and changing, is the representation of extraneous objects. Then there arises within him the need to escape from self and consider the things around, the need *to know*. He does not ask himself what standpoint he must adopt in order to see things, not as they appear to him, but as they are in reality. His eyes, on opening, have discovered a delightful perspective and boundless horizons. Here he takes up his post as on some observation spot ; he undertakes to become acquainted with the world as he perceives it from this point of view. This is the first phase of science,

that wherein the mind relies on the senses in the task of establishing universal knowledge. And, indeed, the senses afford a primary conception of the world, which they show to be a mass of facts, endless in their variety. Man may observe, analyse, and describe them with ever increasing exactness: this very description constitutes science. We are not dealing with any fixed order between facts: the senses show nothing of this kind. It appears to be chance or destiny, or a mass of capricious volitions, by which the universe is governed.

For a certain period of time, man is content with this conception. And, indeed, is it not even at this stage a very fertile one? All the same, whilst observing facts the mind notes that there is a constant relation between them. It sees that nature consists not of isolated objects but rather of phenomena related to one another. It notes that the contiguity of the phenomena, from the point of view of the senses, is no certain indication of their actual correlation. It would like to set out phenomena, not in the order in which they appear to it but in that in which they really depend on one another. Henceforth, it regards purely descriptive science as inadequate, and even inexact, in that it perverts the relations of things. It would like to add explanatory knowledge thereto, but this the senses are unable to procure; for, to effect this, observed relations must be noted and compared together, so as to distinguish between those that are constant and those that are general. Then, once these limits or schemes have been

made, the particular relations we purpose to explain must be fitted into them. Now, the senses only arrive at those relations that are immediately given by things themselves. The understanding, however, intervenes and shows the mind a higher point of view, from which things are really perceived in their general aspect. The mind, then, sets the understanding to interpret, classify, and explain the data of the senses.

The understanding, thus set above the senses, at first attempts to dispense with them, and to build up, unaided, the science of the world. The only thing needed seems to be to take as starting-point those ideas that seem to it self-evident and to develop them in accordance with its own laws. It is difficult to say how far it succeeds in doing this without appealing to the senses. Anyhow, it culminates in a science all of whose parts are rigidly connected with one another, and which is therefore strictly a unity; though, on the other hand, it shows a divergence from real things which the progress of deduction renders increasingly manifest. Now, the order of the idea is valueless except when it explains the order of the phenomena.

Finding it impossible, of itself alone, to constitute science, the understanding agrees to collaborate with the senses, and they work together in concert in order to acquire knowledge of the world. The senses are to take note of facts; the understanding, to build them up into laws. Following this method, the mind tends to a wider conception of the world than former conceptions have

been. The world is an endless variety of facts, linked together by necessary and immutable bonds. Variety and unity, contingency and necessity, change and immutability, constitute the two poles of things. The law accounts for the phenomena ; the phenomena realise the law. This conception of the world is alike synthetical and harmonious, since it admits of the contraries without any restriction, and yet reconciles them with one another. Moreover, as experience shows, it admits of our explaining and anticipating phenomena with ever greater precision. Impressed by these advantages, the mind views them with increasing complacency, and judges of everything in consequence.

Now, is this conception itself of a lasting nature ? Is that science, which the understanding, acting upon the data of the senses, brings into existence, susceptible of completely coinciding with the thing to be known ?

In the first place, is not this absolute reduction of multiplicity to unity, of the changing to the immutable, which is suggested by the understanding, the interchange or blending together of contradictories, after all ? And, if the absolute is the intelligible, is this blending justifiable ? Again, is it sufficient that the understanding should admit the concurrence of the senses, for the mind to take up a central point of view ? In reality, this concession concerns only investigations into the laws of nature ; it does not imply any change in the conception of the world itself. As the understanding imposes on science its category of necessary relation, it does not

matter, theoretically at least, whether the senses participate or not in the production of knowledge. A perfect intellect would derive the whole of science from itself, or, at all events, from the knowledge of a single fact considered in the totality of its elements. The world remains a perfectly single whole, a system whose parts necessarily require one another.

Now, is this category of necessary relation, inherent in the understanding, actually met with in things themselves? Are causes confused with laws, as is implied in the doctrine which defines law as an immutable relation?

This is a question that concerns both metaphysics and the positive sciences. The doctrine that regards the understanding as the final point of view of knowledge has the effect of relegating all particular spontaneity to the world of illusion, of seeing in finality only an internal reproduction of the necessary order of efficient causes, of attributing the sense of free will to ignorance of the causes of our actions, and of leaving in existence only one genuine cause, which produces and governs everything by a single, immutable act. Moreover, this doctrine does not take sufficiently into account the absolute necessity of observation and experiment in the positive sciences; it also introduces fatalism, in a more or less disguised form, not only into the study of all physical phenomena without distinction, but even into psychology, history, and the social sciences.

To discover whether there are causes really distinct from laws, we must inquire how far the laws that govern

phenomena are necessary laws. If contingency, after all, is only an illusion due to a more or less total ignorance of the determinative conditions, cause is but the antecedent set forth in the law, or rather, it is the law itself in its general aspect ; and the autonomy of the understanding is a legitimate one. But if the given world were to manifest a certain degree of genuinely irreducible contingency, there would be grounds for thinking that the laws of nature are not self-sufficient but have their reason in causes that govern them : the standpoint of the understanding, therefore, is manifestly not the ultimate standpoint of the knowledge of things.

CHAPTER I

NECESSITY

By what sign do we recognise that a thing is necessary? What is the criterion of necessity?

If we attempt to define the concept of an absolute necessity, we are led to eliminate therefrom every relation that subordinates the existence of one thing to that of another, as a condition. Hence absolute necessity excludes all synthetic multiplicity, all possibility of things or of laws, and so there is no occasion to inquire if it holds sway throughout the given universe, which is essentially a multiplicity of things that depend, more or less, upon one another.

In reality, the problem under investigation is the following: by what sign do we recognise relative necessity, *i.e.* the existence of a necessary relation between two things?

The most perfect type of necessary concatenation is the syllogism, in which we have a particular proposition shown to result from a general one because it is contained in it and consequently was implicitly affirmed the very moment the general proposition itself was affirmed. The syllogism, after all, is but the proof of an analytical

relation that exists between genus and species, the whole and the part. Consequently, where there exists analytical relationship, we find necessary concatenation. This concatenation, however, *per se*, is a purely formal one. If the general proposition is contingent, the particular one deduced from it, as such, at all events, is equally and necessarily contingent. It is impossible, by syllogism, to obtain demonstration of real necessity, simply by connecting all the conclusions with a major necessary in itself. Is this process compatible with the conditions of analysis?

From the analytical point of view, the only proposition wholly necessary in itself is that which has for its formula A=A. Any proposition in which the attribute or predicate is different from the subject, as is the case even if one of the two terms results from the decomposition of the other, leaves behind a synthetical relationship as a counterpart of the analytical relationship. Can syllogism reduce synthetically analytical propositions to purely analytical ones.

At the outset, we find a difference between the propositions on which syllogism works and the one we have to reach. In the latter, the terms are connected by the sign = ; in the others, by the copula *is*. Is this a radical difference?

The copula *is*, used in ordinary propositions, is perhaps not unrelated to the sign =. From the standpoint of the extension of the terms—the standpoint of reasoning —it means that the subject expresses only a part of the

predicate, a part whose relative magnitude is not indicated. The proposition "All men are mortal" signifies that the species "man" is a part of the genus "mortal," and leaves the relation between the number of men and the number of mortals an indeterminate one. Were this relation known, one might say: "All men $=\frac{1}{n}$ mortals." The progress of science, it may be added, consists in determining with greater accuracy and completeness the species contained in the genera, so that, in a perfect science, the sign $=$ would everywhere have replaced the copula *is*. The formula of this science would be $A=B+C+D+\ldots$; $B=a+b+c\ldots$ etc. Substituting their values for B, C, D, etc., we should finally obtain: $A=a+b+c+\ldots$ Now, is this a purely analytical formula?

No doubt the relation between A and its parts is analytical, but the reciprocal relation between the parts and the whole is synthetical; for multiplicity does not contain the reason of unity. And there is nothing to be gained by alleging that when we replace $a+b+c+\ldots$ by their values we obtain $A=A$, for what science does is to consider A as a decomposable whole and to divide it into its parts.

Still, the objection will be raised, the ideal analytical form, towards which science tends, may be conceived otherwise. The effect of interposing a middle term M between two given terms S and P is to divide in two the interval resulting from their difference of extension.

Middle terms will likewise be interposed between S and M, between M and P, and so on, until all the gaps are completely filled up. The passing from S to P will then be imperceptible. Continuing in this way, we come back to the final essence A, with which everything will be connected by a chain of continuity.

This point of view, indeed, admits of the reduction of all propositions to the formula A *is* A. But this time the copula *is* cannot be replaced by the sign =, for the interposition of any number whatsoever of middle terms cannot entirely fill up the interval between the particular and the general. The transitions, though becoming less sudden, are none the less discontinuous ; and so there is always a difference of extension or denotation between subject and predicate.

It is therefore impossible to reduce particular relations to the formula A=A, *i.e.* by analysis to arrive at the demonstration of radical necessity. Analysis and syllogism demonstrate only derivative necessity, *i.e.* the impossibility of a certain thing being false, if a certain other thing is admitted to be true.

Where analysis is wrong, in so far as it professes to be self-sufficient, is that it admits of nothing beyond an identical proposition as a final explanation, and is unable to reduce to such a formula the propositions that have to be explained. It is useful only if an identical proposition, made up of heterogeneous elements, is supplied as its point of departure ; it demonstrates necessity only if it develops a necessary synthesis. Do such syntheses exist ?

Experience, which offers no universal knowledge whatsoever in time and space and simply makes known the external relations between things, may reveal constant though not necessary relations. Thus, before all else, that it may be necessary, a synthesis must be known *a priori*. True, we might have to find out whether such a synthesis is necessary from the standpoint of things, as it is for the mind. At the outset, however, it is sufficient that it be necessary for the mind for there to be no occasion to discuss its objective reality, since this discussion could only take place in accordance with the laws of the mind. If, perchance, the course of things did not exactly conform to the principles laid down *a priori* by the mind, we should have to conclude, not that the mind is mistaken, but that matter betrays its participation in non-entity by a faint revolt against order.

How are we to recognise that a judgment is *a priori*?

For a judgment to be regarded as *a priori*, its elements, terms and relation must not be derived from experience. That the terms may be considered as not coming from experience, it is not enough for them to be abstract. Experience, after all, gives us no datum which does not present both a concrete and an abstract aspect. I cannot gather up in a single intuition both the colour and the odour of one and the same object. The boldest abstractions may be no more than the extension, performed by the understanding, of the subdivision outlined by the senses. Moreover, experience itself sets us on the path of this extension by giving us more or less abstract data

about things, according to distance, duration, or intensity. That a term, therefore, may be considered as laid down *a priori*, it must proceed from experience neither directly, by a process of intuition, nor indirectly, by a process of abstraction.

Similarly, for a relation to be considered as laid down *a priori*, it is not enough that it should set up any kind of systematisation between intuitions, as though experience supplied nothing that resembled a system. To suppose an intuition absolutely devoid of unity is to depart from the conditions of reality. The most immediate perceptions imply the grouping together of similar parts and the separation of dissimilar objects. A multiplicity, pure and simple, is something altogether inconceivable ; if it offers nothing upon which thought may lay hold it cannot be a datum of experience. Actually, then, in the very objects perceived, there is a certain degree of systematisation ; and so, before affirming that a relation of dependence, set up between two terms, is not due to experience, we must find out if this relation is radically distinct from those we are privileged to set up. This relation must radically differ from those which experience offers us or which we can read in the data of experience.

The field of experience, besides, may be clearly defined : it consists of facts and their observable relations. Facts may be divided into external and internal facts, those proper to the being which is their subject. By the senses we can become acquainted with the former ; by empirical consciousness, or the inner sense, we can

apprehend the latter within ourselves. Observable relations consist of relations of resemblance or contiguity, whether simultaneous or successive.

A synthetical judgment is subjectively necessary, if stated *a priori*; but in order that it may be a sign of necessity, from the standpoint of things, it must in addition affirm some necessary relation between the terms it compares. A major which stated a contingent relation would pass on this character to all its consequents. Now, the objective relations that may exist between two terms are reducible to four: the relations of cause to effect, of means to end, of substance to attribute, and of whole to part. The relations of substance to attribute and of whole to part may be reduced to causality and finality. In the last issue, then, there remain only these relations of causality and finality.

Now, we cannot say regarding any end that it must necessarily be realised, for no event, of itself alone, is the whole of what is possible. On the contrary, there are infinite possibilities distinct from the event under consideration. The chances, then, of realising this event compared with the chances of realising something else are as one to infinity; and so the realisation of any given end, such as the uniformity with which phenomena succeed one another, is, in itself, infinitely improbable and far from being necessary. Besides, even if an end is laid down as one that must be realised, the means to be used with a view to this result are not determined at the same time. Any end may equally be realised by

different means, just as any goal may equally be reached along different roads. True, the means will not all be alike simple or good in themselves. The end, however, as such, is not interested in these differences ; and the reason we take this into account is that we exalt the means itself into a secondary end. The realisation of the end by the means presupposes an agent capable of knowing, preferring, and accomplishing ; and so it is not necessary *per se.*

It is not the same in the production of an effect by its cause, if the word *cause* is given its strict meaning as a productive force.

The cause, strictly so called, is only such if it produces an effect. Moreover, it acts solely by virtue of its nature ; it cares nothing for the æsthetic or moral value of the result. Thus, there are no grounds for admitting any degree of contingency in the simple relation of cause to effect. This relation is the perfect though unique type of primordial necessity.

And so it is only to *a priori* causal syntheses that necessity, alike objective and subjective, appertains : they alone are capable of producing wholly necessary analytical consequences.

To sum up, the criterion of the necessity of a relation is the possibility of reducing it analytically to a subjectively and objectively necessary synthesis. The principle of the necessary conjunction of things, the magnetic stone whose virtue is transmitted to every link, can only be the *a priori* causal synthesis.

Now, if it happened that it were impossible to establish the legitimacy of like syntheses as constitutive or regulative principles of the knowledge of given things, would all necessity become delusive or fallacious ?

Assuredly we should no longer be dealing with a radical necessity, as prevailing throughout the given world, since, even though certain syntheses implied in experience were necessary *per se*, the mind, in the case in question, would not be in a position to ascertain this. Nevertheless, the combination of experience and analysis might still manifest a certain kind of necessity : the only one, indeed, usually followed by the positive sciences. It may, in fact, be conceived that particular syntheses empirically given may be reduced to more general syntheses, and these latter to still more general ones, and so on, until we come to a more or less restricted number of practically irreducible syntheses. The ideal would be to reduce everything to a single synthesis, one supreme law which would contain all the laws of the universe as particular cases. No doubt these general formulæ, founded on experience, would retain the character of this latter, which is to make known what *is*, not what is incapable of *not being*. Nothing could prove them to be necessary *per se*. They would, however, set up a necessary relation between all particular facts, as such. The slightest change in detail would imply the overthrow of the universe. We may therefore accept the possibility of a necessity of fact along with the necessity of theory. The latter is present when the

synthesis developed by analysis is stated *a priori* by the mind and unites an effect to a cause. When this synthesis, without being known *a priori*, is implied in a totality of known facts and is constantly being confirmed by experience, it manifests, if not the necessity of the whole, at all events the necessity of each part, on the supposition that all the other parts are realised.

CHAPTER II

BEING

Does the world, as given in experience, bear the distinctive marks of necessity in the various phases of its development?

On the lowest rung of the ladder of things given, we find *being* or *fact*, pure and simple, as yet indeterminate. Can we say that it exists necessarily?

Since an absolute necessity is unintelligible as regards given things, the necessity of being can consist only in the link connecting it with what is posited before it, *i.e.* with the possible.

What is the nature of this link? Is the realisation of being the inevitable consequence of the existence of the possible?

And, in the first place, can one deduce being from the possible, as the conclusion of a syllogism is deduced from the premisses? Does the possible contain everything required for the realisation of being? Is analysis, pure and simple, sufficient to explain the transition from the one to the other?

In one sense, no doubt, there is nothing more in being than in the possible, since all that is was possible before

being. The possible is the stuff of which being is made. Being, however, thus reduced to the possible, remains purely ideal ; to obtain real being, a new element must be admitted. In fact, of themselves, all possibles lay equal claim to being, and there is no reason, along these lines, why one possible should be realised in preference to the rest. No fact is possible without its contrary being equally so. If, then, the possible is left to itself, everything will be eternally hovering between being and non-being, nothing will pass on from potency to act. Thus, instead of the possible containing being, it is being that contains the possible and something besides : the realisation of one contrary in preference to the other, the act, strictly so called. Being is the synthesis of these two terms, and this synthesis is an irreducible one.

But perhaps this is a synthesis necessary *per se* ; it may be that the mind affirms beforehand that the possible must pass into the act, that something must be realised.

It is worth noting that here we are dealing not with being *per se* but with being as regarded by the positive sciences, *i.e.* facts presented in experience. The synthesis of the possible and the act must therefore be interpreted in such a way as to enable it to apply to the given objects. To establish the origin *a priori* of this principle, by attributing to it such a meaning as would be incompatible with science, would be proving something with which we are not now dealing.

The possible, then, in the present synthesis, is not potency, which is and remains in being both before,

during, and after the act; for potency, as thus conceived, does not belong to the domain of the positive sciences. It is simply a mode of being, susceptible of being presented — though not yet presented — in experience. Similarly, the act is not the change that takes place in potency when it creates an object, the transformation of potency into a generating cause. It is simply the appearance of the fact, of that which is multiple and diverse, in the domain of experience.

Still, even according to this view, the concepts of the possible and of the act seem as though they could be conceived only *a priori*, for the possible is not given in experience, and, speaking generally, the act is the whole of the given. There is no real experience capable of reaching the one or the other of these two objects.

But is it sufficient that the possible should not be given as such to enable us to regard the conception of it as experimental? Looking upon the endless variety and change of things, noting the contradictions in the data of the senses amongst different individuals and even in a single person, the mind is led to regard what seemed relative from its point of view as different from what would appear to it from another point of view. The more observations multiply, the more abstract becomes the idea of the possible, until it is finally stripped of all distinctly imagined content.

If the concept of the act signified the whole of the given, it could not be admitted that it was derived from experience. The expression "the whole of the given,"

however, is unintelligible, whether we regard the given things, past, present, and future, as forming a definite quantity, or as forming an indefinite one. The act, or the fact, speaking generally, is therefore a term of indeterminate extension, the abstract existence of a world capable of being perceived. Thus defined, the concept of the act may be explained by the existence of experience itself, as well as by the perpetual change we notice in things. The more we find one mode of being succeed another mode of being, the more fixed becomes in us the idea of the act, of which we have an example in each distinct experimental datum; whereas the idea of the particularities proper to each fact disappears of itself, by reason of the infinite multiplicity and variety of the experimental data.

It is not the terms, then, of which being consists, *i.e.* the possible and the act, which must be considered as posited *a priori*. There remains the relationship set up between these terms. This relationship, however, which would be essentially a metaphysical one if we were dealing with the passing from the creative power to the act by which it creates, loses this character when the two terms are reduced to their scientific meaning. Thus it is no more than the abstract relation between the present experience and past ones, with respect to which the present experience was simply possible. After this, it does not go beyond the scope of experience, raised by successive abstractions to its highest point of generality.

Nor is this all. The elements of being allow of an

indetermination which prevents us from seeing in the one (the possible) the cause of the other (the actual). It is not contrary to reason to admit that the possible should never pass into the act, or that the actual should exist from all eternity. Thus, not only can the knowledge of being, *qua* reality, be derived from experience, but it cannot have any other origin ; it cannot be attributed to a synthetic judgment *a priori*.

Experience cannot induce us to attribute a necessity of fact to this passing, at all events, since we find that a host of things which have existed, and consequently, are in themselves possible and susceptible of passing into act, remain in the future as pure and simple possibles, without, it may be, anything authorising us to suppose that they will again be realised.

Is it to be admitted that all possibles are, in their essence, eternally actual ; that the present is made up of the past and is big with the future ; that the future, instead of being contingent, already exists in the mind of the one supreme purpose or understanding ; and that the distinction between being and the possible is but an illusion caused by the interposition of time between our point of view and things in themselves ?

This doctrine is not only unwarranted and impossible of proof, it is also unintelligible. To say that each thing is actually all it is capable of being is to say that it unites and reconciles, within itself, contraries, which, from the knowledge we have of them, can exist only by replacing one another. But how can we conceive of these essences

as formed of elements that are mutually exclusive? Again, how can we admit that all forms share alike in eternity, as though they all possessed the same value, the same right of existence? Finally, things, as considered in time, are not all realised in the same degree. One gradually becomes all it is capable of being; another is done away with just when it was beginning to develop. This difference must pre-exist in the eternal actuality attributed to the possibles. Accordingly, they are not all actual to the same extent. In other terms, the ones are relatively actual; the others, in comparison, are only possible.

Actually given being, then, is not a necessary sequel of the possible: it is a contingent form thereof. Still, although its existence is not necessary, can this be said of its nature? In its own distinctive development, is it not subject to an inviolable law? Does it not bear within itself that necessity from which it is released in its connection with the possible?

The law of being given in experience may be expressed in several formulæ, which all have the same meaning, at bottom: "Nothing happens without a cause," or "All that happens is an effect: an effect proportioned to its cause," *i.e.* containing nothing more than this latter; or "Nothing is lost, and nothing created," or, finally, "The quantity of being remains stationary."

This law cannot be considered as given with being itself, for the idea of uniformity and immutability is

foreign to being given as such, which consists essentially of a multiplicity of various changing phenomena. The law of causality is the synthesis of two mutually irreducible elements, change and identity ; it is not sufficient that one of the two terms, change, should be accepted as realised, in order that the adjunction of the other should follow analytically.

Perhaps, however, this law is necessary as the spontaneous affirmation of reason. Perhaps it is conceived *a priori*, and, by virtue thereof, imposed on being ?

Where, we may ask, in the data of experience, can there be found an object corresponding to the term "cause," which means "creative power," and a relation corresponding to the link of "generation" which the mind sets up between cause and effect ?

If the question is stated in these terms, the principle of causality is certainly *a priori*. It is not in this sense, however, that it is implied in the knowledge of the given world. The idea of a generating cause could be of no service to the one who, as a strict scientist, investigates solely the nature and order of phenomena. In reality, the word "cause," when used scientifically, means "immediate condition." According to this view, the cause of one phenomenon is still a phenomenon, and can be nothing else ; otherwise, investigation into causes would not come within the domain of the positive sciences ; all the same, it is a phenomenon which must previously exist if a certain other phenomenon is to be brought about.

But, it will be urged, it is really erroneous to regard

the cause as having, in the first place, been conceived as a metaphysical entity contained in the phenomena : it is no more than their determining condition. It has no bearing on being in itself, but on the knowledge of the phenomena ; it implies solely what is needed to make this knowledge possible. It is right to say that causality is but a relation and a link set up between the phenomena ; it must be added, however, that it is a link of necessity, set up *a priori*.

Thus understood, there is no doubt but that the principle of causality is nearer to the conditions of science than when it implies the hypothesis of a thing in itself. Nevertheless, it still contains an element which science does not demand : the idea of necessity. It is enough that relatively invariable relations exist between the phenomena for investigation into causes to be both justifiable and fruitful. Again, it is contrary to the essence of the phenomena to be necessarily linked to one another. The mode in which they follow one another, dependent on the mode of action of things in themselves, can have only a relative character. To regard causality as a link of absolute necessity between the phenomena is to fall into the error we wished to avoid, though now exalting the phenomena into things in themselves.

The exact meaning of the principle of causality, as far as it applies to the study of the given world, is as follows : any change that occurs in things is invariably connected with another change, as a condition, not with any change, but with a fixed one, of such a nature that there is never

anything more in the conditioned than in the condition. Now, the elements of this principle would all seem to be taken from experience. *A priori*, man was disposed to admit absolute beginnings, changes from nothingness to being and from being to nothingness, successions of indeterminate phenomena. It is experience that has abolished these prejudices. It is the march of observation and comparison, of reflection and abstraction, *i.e.* of experience interpreted, though not replaced or supplemented, by understanding, which has shown that a change is never something wholly new ; that any change is the correlative of another change that has come about under the conditions in which it happens, and that the relation between such change and some other is an invariable one.

It cannot then be said that the principle of causality governing science is a law imposed on things by the mind. In the terms by which the mind would impose it on things, the given being, *i.e.* the phenomena, would be unable to realise it ; and, on the other hand, the formula that applies to the phenomena contains only elements derived from experience.

All the same, this formula sets forth the existence of an invariable relation between a particular change and some other. Now, whereas invariability, *per se*, is not tantamount to internal necessity ; on the one hand, it does not exclude it, but is even its external symbol ; on the other hand, it sets up between modes of being what may be called a necessity of fact. Does it not follow that the

principle of the necessary relation of the phenomena is deserving of all confidence from the practical point of view, and that, even from the theoretical point of view, it is more probable than its contrary ?

It cannot be denied that the idea of this principle has been the very life-blood of scientific knowledge. Science came into being when man conceived of the existence of natural causes and effects, *i.e.* of invariable relations between given things ; when, instead of asking itself what was the suprasensible power that produced the phenomena and why it produced them, it asked itself what was the phenomenon of nature on which the thing to be explained depended. All advance in science confirms this conception, and to imagine a real world in which the phenomena come about unceasingly, *i.e.* without invariable antecedents, would be quite improbable.

Still, we must not forget that experience itself has introduced to the human mind the scientific idea of natural cause, and gradually clarified this idea. The latter is not the idea of a principle *a priori* which governs the modes of being, it is the abstract form of the relation existing between these modes. We cannot assert that the nature of things has its derivation in the law of causality. To us, this law is but the most general expression of the relations arising from the observable nature of given things. Let us suppose that things, capable of changing, nevertheless do not change : the relations will be invariable, without necessity actually

holding sway. Thus science has for its object a purely abstract and exterior form, which does not prejudice the inmost nature of being.

Is it not likely, however, that the exterior is the faithful representation of the interior? Is it admissible that the acts of a being may be contingent, if it is established that the manifestations of these acts are linked to one another by immutable relations? If the shadows passing through the cave of Plato follow one another in such fashion that, after closely observing them, one can foretell exactly the appearance of the shadows that are to come, this is because, to all appearance, the objects that project these shadows themselves follow one another in invariable order. No doubt it would be possible for the totality of the manifestations and acts not to be given; but if, one of these manifestations being given, the others are given likewise, the simplest hypothesis is to admit that the acts themselves are similarly connected with one another. To have the right, then, to question the internal necessity of things, it appears as though we must be able to contest the absolute regularity of the course of phenomena and to establish the existence of some disharmony, however slight, between the postulate of science and the law of reality. Experience may not supply us with the means of doing this, but can we affirm that it pronounces in favour of the contrary theory?

All experimental finding is reduced, in the end, to confining within as close limits as possible the value of

the measurable element of the phenomena. We never reach the exact point at which the phenomenon really begins and ends. Moreover, we cannot affirm that such points exist, except, perhaps, in indivisible instants: a hypothesis which, in all probability, is contrary to the nature of time itself. Thus we see, as it were, only the containers of things, not the things themselves. We do not know if things occupy, in their containers, an assignable place. Supposing that phenomena were indeterminate, though only in a certain measure insuperably transcending the range of our rough methods of reckoning, appearances would none the less be exactly as we see them. Thus, we attribute to things a purely hypothetical if not unintelligible determination when we interpret literally the principle by which any particular phenomenon is connected with any other particular phenomenon. The term "any particular phenomenon" does not strictly express an experimental concept, and perhaps implies contradiction with the conditions of experience itself.

Is it, then, in conformity with experience to admit of a proportionality, an equality, an absolute equivalence between cause and effect? No one regards this proportionality as constant if things are considered from the point of view of utility, of æsthetic and moral value, in a word, of quality. On the contrary, from this point of view, it is generally admitted that great effects may result from small causes, and *vice versa*. The law of equivalence, then, can be regarded as absolute only if

we are dealing with pure quantities, or else with relations between quantities of the same quality.

Where, however, are we to find a consequent which, as regards quality, is exactly identical with its antecedent? Would this also be a consequent, an effect, a change, if it differed from its antecedent neither in quantity nor in quality?

The march of observation increasingly reveals a profusion of properties: variety, individuality, life, where appearances have shown only uniform and undistinguishable masses. Hence, is it not likely that the simple repetition of the same quality, a thing devoid of beauty and interest, exists nowhere in nature, and that homogeneous quantity is but the ideal surface of beings? The stars, for instance, seen from afar, appear but as geometrical figures, whereas in reality they are worlds made up of a thousand various substances. The change of intensive quantity, *i.e.* the increase and diminution of the same quality, may also be reduced, in the end, to a qualitative change; since, when carried to a certain point, it culminates in the transformation of a quality into its opposite, and the property manifested in the case of a considerable intensive change must necessarily pre-exist in the changes of detail, of which it is the sum total.

True, there remains the hypothesis of a quantity devoid of all quality; but what idea can one form of such an object? A quantity can be no more than a dimension or degree of something, and it is this something that constitutes quality, the physical or moral mode

of being. Whereas quality may very well be conceived as the substance of quantity, the latter, regarded as the substance of quality, is unintelligible; it acquires signification only as a limit, a point of intersection; and all limit presupposes a thing that is limited.

If, then, even in the most elementary forms of being, we find something qualitative, the indispensable condition of existence itself; the recognition that the effect may be disproportionate to the cause, from the point of view of quality, is an admission that nowhere in the real, concrete world can the principle of causality be rigidly applied.

Indeed, how can we imagine that the cause, or immediate condition, really contains all that is needed to explain the effect? It will never contain that wherein the effect is distinct from itself, that appearance of a new element which is the indispensable condition of a relation of causality. If the effect is in every respect identical with the cause, it simply forms one with it and is not a true effect. If it is distinct from it, this is because it is, to a certain extent, of another nature; and in that case, how are we to set up, not an equality, strictly so called, a thing that is unintelligible, but even a proportionality between the effect and the cause; how are we to measure qualitative heterogeneity, and establish the fact that, in identical conditions, it always happens in the same degree?

Finally, if we are enabled to reduce changes in detail to permanent general relations, so that the reciprocal

heterogeneity of particular facts does not exclude their relative necessity, does not the progress of the various sciences show us that these general relations themselves, a summing up of particular relations, are also amenable to change? Is it not the most probable induction that we cannot reach an absolutely fixed law, however simple the relations considered, however wide the bases of observation? And if the whole varies, must there not be in the details some rudiment of contingency? Moreover, is it strange that we cannot discern in the infinitely small the causes of change in the infinitely great, since, even in this infinitely great, the change is almost imperceptible?

The reality of change is no less evident than that of permanence; and if two changes, working in opposite directions, can be conceived as producing permanence, it is unintelligible that absolute permanence should give rise to change. Change, then, is the principle; permanence is but a result; and so things must admit of change, even in their most immediate relations.

But, while there is no fixed point on which the variations of things can be based, the law of causality, which affirms the absolute conservation of being and of the nature of things, does not apply actually to the data of experience. No doubt it expresses an extremely general mode of being; but, in setting forth this mode of being as altogether independent of its opposite, which, nevertheless, is equally real and primordial; in positing determination and permanence before change and life, it dis-

closes the original intervention of the understanding, which, instead of simply observing reality, endows it with a form adapted to its own tendencies. The law of causality, in its abstract and absolute form, may thus rightly be the practical maxim of science, whose object it is to follow, one by one, the lines of an endless plan ; but it does not appear as anything more than an incomplete and relative truth, when we attempt to bring before the mind that universal intertwining, that interpenetration of change and permanence, which makes up life and real existence. The world, considered in the unity of its real existence, presents a radical indetermination, doubtless too faint to be apparent if we observe things only for a very small period, though sometimes distinct enough when we compare facts separated from one another by a long series of intervening links. There is no equivalence, no relation of causality, pure and simple, between a man and the elements that gave him birth, between the developed being and the being in process of formation.

CHAPTER III

GENERA

All things presented in experience are based on *being*, which is contingent both in its existence and in its law. Everything then is radically contingent. Nevertheless, necessity would still have a very considerable part to play, if the contingency inherent in being, *qua* being, were the only one in the world ; if, once being is posited, everything proceeded from it analytically, without the addition of any new element.

Judging by appearances, being is not only presented to us *qua* being, *i.e.* as a series of causes and effects ; the modes of being also show forth resemblances and differences, which permit of their being arranged in groups called *genera* or *laws*, enabling them from small groups to form larger ones. Every mode contained in a lower group is, *a fortiori*, contained in the higher one of which this lower group forms part. In this way, the particular, or the less general, finds its explanation or reason in the general, or the less particular. Thus the modes of being may be systematised, unified and thought.

Is this property inherent in being, *qua* being, or is it, with respect to being, something new ?

Of course, logical organisation does not increase the quantity of being. Similarly, a bronze statue contains no more matter than the metal of which it is made. Still, in logically ordered being, there is a quality which did not exist in being, pure and simple, and of which being supplied only the material condition : explicableness. This quality is connected with the existence of types, or formal unities, under which is included the discrete multiplicity of individuals. It has its origin in the existence of *notions*. Now, notion is unity within multiplicity, resemblance within differences. Through the degrees of which it admits, it sets up a hierarchy amongst causal connections ; gives to some, along with a general relativity, the preponderance over the rest, and thus makes, of the world of causes and effects, an anticipated symbol of organisation and life. Notion is both one as genus and multiple as a collection of species. Thus, it is not contained in strict being, the essence of which, so far as we are dealing with the given being, is diversity and multiplicity. Superior to being, it causes to proceed therefrom, amongst all the modes of which being is susceptible, those that will supply it with appropriate elements, *i.e.* forms that to some extent are similar, amid the diversity on which their separateness is based ; it is realised by becoming the centre of the system it has thus organised. One in essence, it is not confounded with the multiple forms whose appearance it determines, but is incorporated and becomes visible and concrete in them. Because it is thus closely united to things, it would

seem to form an integral part of them. It might disappear, however, without things ceasing to be. No doubt, things would lose that harmonious aspect which results from the union of similars and the separation of opposites, and which is the expression of idea; they would be nothing but an absolutely barren chaos. All the same, they would subsist, just as matter, from which the life has been taken away, subsists in a state of disintegration.

It is not indispensable, however, that notion should be analytically due to being for the existence of genera to be regarded as necessary. It is enough for mind to declare, apart from all experience, that being must assume an explicable, that is to say, a rational form, and must conform to the laws of thought which demands relations of extension in the terms that it considers. In a word, it is sufficient that the synthesis "being + notion" should be posited *a priori* as a causal synthesis. Now, is this the case?

The solution of this question depends on the meaning we attribute to the word "notion." If we regard notion as an immutable type which really exists distinct from given things, a model whereof given things are but imperfect copies, then we cannot accept notion as a term supplied by experience. Similarly, the link of participation which connects particular things with notion as thus conceived can only be affirmed *a priori*. Is it really in this way that the explicableness of things is implied in the study of nature?

No doubt it would be profitable to know that there exist suprasensible ideas or forms, types of given genera, if we could become acquainted with these ideas in themselves. Again, once possessed of these perfect models, the mind would disdain — and not without reason — any acquaintance with defective copies, and would neglect experience, which has no other object than these copies themselves. It cannot, however, be proved that the mind is capable, without the aid of experience, of giving a content to notion or idea regarded as the metaphysical type of sensible things. Here the original is known only by the copy. The function of mind consists in transfiguring the abstract type of given things by giving it the form of perfection and eternity. In these conditions the conception of metaphysical types has no purpose in the study of the phenomena. The synthesis of being and notion, thus interpreted, may be knowledge *a priori*, but it is not this synthesis with which we are dealing.

Will it be said that the element known *a priori* is in no way the content of notion, the sum total of the characters it comprises, but consists of the link of necessity set up between these characters, and therefore that the concept of notion, while not presupposed by things themselves, is at all events presupposed by an acquaintance with things?

This way of conceiving notion is not exactly the one that controls the positive sciences. It is calculated to render the scientist either presumptuous or dis-

couraged. Convinced that things allow themselves to be confined within definitions, the scientist exalts into final truth, into absolute principles, the formulæ in which these investigations have culminated. This is the origin of systems, those vain, rigid trunks, from which the sap is gradually being withdrawn, and which are given up to death. If, with greater circumspection, the scientist waits until his formulæ are adequate to reality before he sets them up as principles, he sees disappear before him the object of his investigations in proportion as he approaches: the very perfection of the methods and of the instruments of investigation only convinces him more and more of the purely approximate character of the results he obtains. This is the origin of that scientific scepticism which is determined to see in nature only individuals and facts, because it is impossible to find therein absolute classes and laws. The object of science is the study of phenomena; it is false to itself if it begins by adopting such an idea of phenomena as transforms them into things *per se*.

In its application to the study of nature, notion, instead of being a distinct entity, is but the sum total of the characteristics common to a certain number of beings. It is not immutable, but relatively identical in a total of given things. Nor is it perfect, a positive characteristic; it is comparatively devoid of accidental elements, a negative characteristic. Similarly, the link between notion and being is not some mysterious participation, a translation of pure thoughts into images accessible to

the senses, a symbolical analogy between phenomenon and noumenon. It is not even an immutable correlation between sensible elements, a necessary systematisation of phenomena. It is simply the relation of the part to the whole, of the continuum to the container. In this way, the synthesis of being and notion, in its scientific acceptation, may be known by experience and abstraction, for experience shows us the resemblances and the differences between things, whilst abstraction gradually eliminates the variable and accidental characteristics, retaining only those that are constant and essential. The idea of a class, *i.e.* of a whole, being thus formed, experience teaches us that this or that being presents characteristics which are the distinctive signs of the class. Consequently we compare this being with its fellow-beings ; we bring it into the relative whole of which these latter are composed.

The union, then, between being and notion, the existence of genera, is not only a synthesis, it is even a synthesis *a posteriori*. It is therefore not necessary in theory, though it would seem impossible to deny that it is necessary in reality. For the march of science has increasingly proved that everything has its reason as well as its cause ; that every particular form comes under a general form ; that everything that is forms part of a system. The fact that it is impossible for us logically to connect any detail with the whole proves our own ignorance, not the lack of order in the things themselves.

It may, nevertheless, be remarked that the grouping

of things as notions is always more or less approximative and artificial. On the one hand, the real comprehension of notions can never be exactly defined. On the other hand, there are always beings that do not come exactly within the limits set up. Even the most general and fundamental notions or categories have been finally tabulated, as though being could not tolerate absolute immobility even in its profoundest depths. The march of science will undoubtedly define more or less precisely the comprehension and extension of genera, but who would dare affirm that this definition can ever be complete and final? Who would dare affirm that there exists in nature a determinate number of genera radically separated from one another by the presence or the absence of precise characteristics, and that all beings, without exception, fall exactly under these general types? It is impossible to affirm that, in addition to being, disciplined by notion, there does not remain a certain quantity of being, more or less ill-adapted to its ordaining influence; or even that being is always intelligible to the same extent, that the distribution of beings into genera is not sometimes less and sometimes more profound, definite, and harmonious.

And so it is contingently that notion and all the determinations of which it admits are superposed on being. The modes of notion, regarded externally, from the point of view of being, do not come about inevitably. But does not the development of notion itself, *i.e.* the

decomposition of the general into the particular, obey a necessary law, and is not external contingency then reduced to an internal necessity ?

The law of notion is the principle of identity according to which notion remains identical with itself, is preserved as it is, and undergoes neither increase nor diminution through all the logical functions it is destined to fulfil. This is, we might say, the permanence of notion itself. By virtue of this law, what is contained in a partial notion is, *a fortiori*, necessarily contained in notion as a whole.

This formula does not analytically result from the concept of notion itself, for we may conceive that a whole can acquire or lose parts, without on that account ceasing to be a whole. A type can change, without thereby ceasing to be a type.

The law of notion, then, is a synthetical proposition. Is it affirmed *a priori* ?

The terms of this law may be interpreted in many ways.

According to one of these interpretations, there are in nature a fixed number of real general types which hold the same position, with regard to individuals, as substance holds with regard to accidents. The identity of notion, then, throughout its various functions, is really due to the fact that it is one and the same being that supports the individuals of one and the same species, and these have only the vain appearance of a distinct existence.

According to another interpretation, the principle of identity does not concern things in themselves, but only

the knowledge of things ; it is only an *a priori* condition of experience, and its true signification is determined by the needs of thought. This view affirms that, however it may be with transcendent types, it is always exactly the same immanent notions that are represented in the various phases of the explanation of things ; consequently, the total notion contains exactly the entire content of the partial notions. Moreover, the permanence of all particular notions is explained by the permanence of one supreme notion which contains all the rest ; the genera of a lower order all come exactly under a smaller number of higher genera, and so on, until everything is reduced to unity. Lastly, and for this very reason, the link that unites the particular to the general, the conditional to the condition, the thing explained to the reason that explains, is an absolutely necessary one.

Manifestly, in either of these acceptations, the principle of identity is posited *a priori*, since nature offers us no two things that are exactly identical, and we are continually finding ourselves brought up against irreducible characteristics. It is not these absolute maxims, however, that are demanded by science. Used as a framework for reasoning, they would produce only sophisms, because the concrete terms supplied by experience would never satisfy the exact conditions of identity and extension which they demand. They would impose on scientific investigation—as regards the nature of genera and their relations to one another—a point of view that might not be permissible and might warp observation. How,

indeed, are we to discover contingent elements in the world, granted that they exist, if it is previously affirmed that all relations between things must strictly be reduced to the relation between substance and accident, or between the whole and the part ; if we state the scientific problem in terms which, *a priori*, exclude contingency and regard it as a necessity in disguise ? Every question asked of the given world is undoubtedly permissible, but only on condition that the postulate it contains is not first set up as an indisputable truth. On the other hand, we must be ready to question this very postulate and begin things from farther back, in case experience should disprove the previsions or forecasts that have been formed.

In its application to the positive sciences, the principle of identity does not take for granted the existence of substantial archetypes. How might phenomena be logically connected with these heterogeneous essences ? Nor does the principle of identity absolutely presuppose the identity of the generic element in species, the reduction of all notions to a single one, or the necessary connection between the particular and the general.

Undoubtedly, in a syllogism, it is the same generic term that is applied to the species and to the individual contained in that species. The identity, however, is only one of words, for it is impossible to find a characteristic that is exactly the same in two individuals, and it is likely, in accordance with the law of analogy from which the existence of species follows, that, if two individuals were identical in one point, they would be in all. Nature

never gives us anything but resemblances, not identities; from observed resemblances syllogism can only infer non-observed resemblances. It could not lay claim to a rigidity incompatible with the experimental data which, alone, are capable of supplying it with material.

Similarly, positive science does not require the possibility of reducing all notions to unity. It simply exacts a relative hierarchy of more or less general notions. Whether, at bottom, there are one or more systems of notions; whether, in the last analysis, these systems have a single basis or not; whether all species are exactly distributed in genera or not; or whether there exist intermediate species, concrete reasoning will not be any the less possible.

In short, the character of absoluteness is simply apparent, alike in the form of the syllogism and in its matter. One cannot claim to set up exact relations of extension between wholes and parts which, in themselves, are not exactly circumscribed. When we say that Paul, forming part of the species "man," forms part, *a fortiori*, of the genus "mortal," which contains the species "man," we simply mean that, if Paul resembles, in many directions, other beings already compared with one another and united under the notion "man," it is extremely probable, practically certain, that he will also resemble them in whatsoever concerns mortality. Now, for such a deduction to be possible, we need only admit that there are, in nature, bundles of resemblances of such a kind that, given certain groups of resemblance,

it is extremely probable that certain others will also be manifested: this, strictly speaking, is the law of analogy.

If this is so, the principle of identity in its scientific usage offers no characteristic incompatible with an origin *a posteriori*. Experience is capable of supplying us with ever more definite notions of genera, with ever more general resemblances, and with ever more constant conjunctions of resemblances.

Born of experience, the principle of identity cannot be regarded as necessary *de jure*, as imposed on creation or on our knowledge of things.

Is it not, however, imposed on the mind by the very form of science, by the ideal it pursues, and to which, in fact, it is ever drawing nearer? Is it not the principle of logic whose jurisdiction is accepted by all the sciences? Is it not therefore practically recognised as necessary?

It must be noted that logic, in spite of the indispensable part it plays in knowledge, is but an abstract science. It does not determine the degree of intelligibility presented by real things. It considers notion, in general, under the most precise form that experience, modified by abstraction, can give it, and deduces its properties by a method appropriate to the understanding, *i.e.* according to the idea of the permanence of this notion itself. Logic develops the system of laws that apply to any notions whatsoever placed in rapport with one another, granted these notions remain identical. It forms frames or limits within which experience is called upon to place

a content, at the risk of stretching, even breaking them. The reason it offers considerable practical certainty is because it develops an extremely simple concept, the middle type, as it were, of an infinite number of experiences, and thus its definitions of words are almost definitions of things. So, in statistics, probability approaches nearer and nearer to certainty in proportion as the basis of observation becomes wider; for then particularities increasingly cancel one another, to allow the general fact to emerge in all its purity. Logic, however, would prove false to science instead of serving it, if, after artificially completing for the benefit of the human mind the crystallisation outlined by experience, and giving to the generic form a rigidity of contours which nature did not impose upon it, it then claimed to set up this abstraction as an absolute truth, a creative principle of the reality which gave it birth. Laws are the channel along which rushes the stream of facts: these latter have hollowed it out, although they follow its track. And so the imperative character of the formulæ of logic, although practically justified, is but an appearance. In reality, objective logical relations do not precede things: they spring from them. They might vary, if things themselves happened to vary, so far as their fundamental differences and resemblances are concerned.

But can it be said that such variations take place? Does not the attempt to explain phenomena bring us, sooner or later, in presence of what is called the nature

of things, *i.e.* of immutable relations and properties? Though the stream hollows out its own bed, does it, at the outset, of itself flow in any particular direction? Beneath the laws that result from change, do we not find those that determine it? Are these latter still variable? And is not this the last thing we can say: "Everything changes, except the law of change"?

Assuredly it is legitimate that the human mind should be strongly linked to that idea of the nature of things to which it owes its victory over destiny and the powers of caprice, its entrance and progress in the career of science. But this idea, in turn, must not hold exclusive sway, and, in another form, reduce belief to fatality. Whilst the first glance, from this point of view, cast upon the universe, may have given rise to the belief that things really had immutable properties and an eternal nature in which reason was to be found behind all their vicissitudes, a closer investigation shows that what had been regarded as the immutable substratum of things was no more than a shifting and superficial layer; and, the farther we enter into the heart of reality, the more this steady foundation which was to support everything retreats before us. Strong in the idea of genera and laws, the human mind hoped to replace artificial classifications by natural ones. With the advance of observation, however, any particular classification which was looked upon as natural in its turn appeared artificial; and the question is asked if it would not be a good thing to substitute for all rational systematisation the

simple design of a genealogical tree. Now, if it is impossible to find in nature a perfectly constant relation ; if the most essential laws and properties seem to some extent indeterminate, is it not likely that the very principle of the distribution of phenomena into genera and species (which, in its scientific use, after all, is but the most general and abstract form of the laws of nature, after the principle of causal conjunction) is also somewhat contingent and indeterminate ?

Thus, both reasoning *a posteriori* and speculation *a priori* afford ground for the idea of a radical contingency in the production of resemblances and differences from which the genera and species of nature result, *i.e.* in the existence and law of notion. Nothing proves that there are genera the comprehension and extension of which are exactly determined and immutable. It may happen that notion, in the things that express it, may receive an ever closer definition ; that subjects fall with ever greater exactness under determinate predicates, abandoning those characteristics that partook of collateral notions. Sprung from being, as from matter in the line of creation, logical form in its turn is capable of reacting on being and permeating it more profoundly. On the other hand, it is possible to conceive that being, marshalled by notion under strange laws, should endeavour to return to its primordial state of dispersion and chaos ; and that, consequently, the importance of logical order, of the distribution of things into species and genera, should diminish throughout nature.

True, these changes would remain as ideal possibilities or illusive appearances were the principle of causality accepted in all its rigour, for then the nature of the antecedent would wholly and of necessity decide the nature of the consequent and there would be no room for harmony, the germ of which did not previously exist in the given conditions. Now, cause, as such, is indifferent to harmony and to disorder alike : causes, left to themselves, only oppose one another and give results identical with those of chance. Thus, disorder would be eternal and irremediable did not the forces of which the world is made up, inevitably producing their effects, admit of any superior intervention throughout their entire activity. Still, if cause is susceptible, to some extent, of submitting to direction, the virtue of notion becomes efficacious. In the world of forces, it determines a productive convergence, leading them to produce things instead of eternally tossing about in a void without succeeding in peopling it.

CHAPTER IV

MATTER

It is contingently that being receives logical form ; and that form itself, in its proper development, offers a certain scope to contingency. Are these the only principles that we have the right to exact from necessity ? Once being and notion are posited, have we only to deduce their inevitable consequences in order to explain all things ?

Logical order is not only presented in its elementary form ; it appears before us in things that may be counted and measured, in extended and movable essences, in what is called matter. Is this new form of being analytically derived from the former ?

It may seem, at the outset, that material form is but an accident, regarding which logical determinations play the part of substance : are not extension, duration, motion, after all, notions, general ideas in which we include certain given things ? Here there is confusion, however : if mathematical properties are notions, it does not therefore follow that they are nothing but notions. It is one thing to say that an essence is thought, it is quite a different thing to say that it is a thought.

The elements of matter may be reduced to extension and motion, for motion implies duration and produces diversity, whence results number. Now, to be in a position to reduce extension and motion to purely logical essences, we must regard the former as only a coexistence of notions, and the latter only a succession of states which themselves, at bottom, are made up of different notions. Is this purely logical conception of extension and motion justified?

The property of a notion, that which constitutes its essence and perfection, is that it should be exactly circumscribed, and consequently separated, by an interval, from specific notions of the same order as itself; also that it should entirely come under relatively generic notions. The generic element is identical in two notions of the same genus, and the specific difference consists of the presence or the absence of one and the same characteristic. Consequently, notions can be only exterior or interior to one another. Two contents of the same order are mutually exterior; they are interior as regards their common container. Thus the world of notions is essentially discontinuous.

Now, the category of discontinuity, applied to extension and to motion, makes of the former an infinite number of infinitely small points, and of the latter a series of positions that correspond to an infinite number of infinitely short instants. But infinitely small points either touch one another and then form but one whole, or they are distinct from one another, and are

then separated by intervals which, however small they may be regarded, can never be wholly filled by other points of the same nature. Similarly, infinitely short instants either coalesce or leave between one another gaps impossible to fill. Hence it follows that, in the hypothesis in question, a species, even of finite magnitude A . . . . B, cannot be traversed by a moving body M. For there is an indefinite number of points between A and B. Likewise, a moving body, which is supposed to move from A to B, is, in reality, motionless. For at each indivisible instant it is at an indivisible point; and the law of notions requires that there should not be in the whole, *i.e.* in total duration, anything which there is not in the parts.

In this system, after all, extension and motion are but relations. Things are wholly defined and solely distinguished by internal properties which are pre-existent to these sensible appearances. This doctrine is not a satisfactory one, since it has for its consequence the identification and blending together of certain things which, in reality, are distinct. Symmetrical figures that are not superimposable belong to this class. The distinction of these figures is not a purely abstract one; it finds its application in the experimental sciences, and explains, more particularly, the differences in chemical properties shown by certain crystals.

Extension is not a multiplicity co-ordinated by a unity: it is a multiplicity and a unity blended together and identified, as it were. These are not parts exterior

to one another, *qua* parts of the same order, and interior, *qua* contained in parts of a higher order: they are similar parts, devoid of hierarchical order, both interior and exterior to one another. In a word, we are dealing with something continuous. Similarly, time is a continuous duration, and motion a continuous passing over from one place to another. This idea of continuity, restored to the concept of extension, time, and motion, brushes aside the sophisms into which one is led when attributing to these concepts a purely logical signification.

The mathematical properties, then, are not an analytical synthesis of the logical properties, a combination the logical properties of which contain alike the elements, law and *raison d'être*. They involve a new element, heterogeneous and irreducible: continuity.

Nevertheless, it does not immediately follow that the existence of the mathematical properties is contingent. Cannot they be considered, indeed, as conceived *a priori*, and therefore imposed on the nature of things? Does not the knowledge of continuity in co-existence and succession, *i.e.* the knowledge of space and time, offer the characteristics of a rational intuition? May not our idea of motion be due to an elaboration of space and time, wrought by the mind itself?

Unquestionably this is a legitimate doctrine if we are dealing with space and time regarded as things *per se*, one and infinite, capable of subsisting, even though the phenomena should be done away with, and if we are also dealing with motion, regarded in its absolute beginning,

as an act of primordial spontaneity. Experience and abstraction can furnish us with nothing similar. It is not in this way, however, that the sciences which deal with the given world consider space, time, and motion. To them space is but extension indefinitely prolonged ; time is but indefinite duration ; motion is but the change in position of one thing with reference to another.

If this is so, experience is sufficient to account for the scientific concepts of space, time, and motion. Indeed, it offers us a series of extended and movable objects whose end we never see, however great our range of vision.

Will it be alleged that in extension, duration, and motion, unity already exists, and that a concept which implies unity, in whatsoever degree, cannot be derived from experience ? In that case, we must deny the very existence of knowledge *a posteriori*, for given things necessarily form a distinct whole with reference to what is not given. Besides, if, in order to circumscribe exactly the rôle of experience, we remove from the empirical concepts of extension, duration, and motion, the connection of the parts with one another, as having been added by the mind, what remains ? A something difficult to define, and which has no hold either on the mind or even on the imagination and the senses. By removing from the distinctive domain of experience all that in any degree implies unity we end in making of the given elements an eternally unimaginable, inconceivable, and indefinable unknown, which is the same thing as denying its existence. Everything, then, comes from mind ;

experience is no longer a distinct mode of knowledge, it is a less rigorous systematisation than that of thought; mind has no other laws with which to become acquainted than those essentially its own. Dualism, however, which we thought we had abolished, soon reappears within mind itself in the necessary distinction between the *a priori* intuitions of sensibility and the *a priori* notions of the understanding; and now, we have not to find out whether the former, which involve mathematical properties, are to be reduced to the latter, or whether they have their origin in sensibility itself, as in some heterogeneous faculty. The terms of the problem have changed, though the problem itself is essentially the same.

We should even be restricting immoderately the range of experience were we to remove from it the forms of space and time because to us they appear indefinite. Immediate experience, assuredly, affords us nothing similar. A series of experiences, however, may well give us the idea of an endless succession, unless we eliminate from experience all intellectual activity, all participation of the understanding, which would make it an inconceivable process, not only in its object but even in its nature. For knowledge to be experimental, it is sufficient that it should have an object, the matter and form of which are contained in the data of the senses or of the empirical consciousness. The operation by which the understanding extracts, from the data of the senses, the more or less hidden elements which they

contain, does not transform these data into an element *a priori*.

Thus, the concepts of extension, duration, and motion, as presupposed by the knowledge of the given world, do not need a metaphysical origin.

But it may be objected that we are not dealing only with these concepts in their indeterminate acceptation, we are also dealing with their determinations; the latter, at all events, can only be known *a priori*, and are therefore necessary. Is it not *a priori* that the mind constructs the triangle, the circle, the sphere, uniform motion, parallel forces, and, speaking generally, the mathematical and mechanical definitions? Can these exact, complete, adequate definitions be derived from existence? If mind did not create matter, it created form, for these are models that nature cannot equal. There is no real straight line, no real circle, no real equilibrium.

Assuredly it is impossible to explain, by experience the exactness of mathematical determinations, if we regard this exactness as a positive and absolute characteristic, testifying to superior perfection. It would seem, however, as though it were rather a negative characteristic resulting from the elimination of relatively accidental properties. A straight line is but the trajectory of a moving body going from one point to another, and to that other only; equilibrium is but the state in which a body finds itself when the resultant of the forces that act upon it is nil. Now, experience itself invites us to eliminate the accidents that disturb the purity of

mathematical determinations. The trunk of a tree, which a close view shows to be crooked or tortuous, seems more and more straight, the farther one recedes. What need have we of notions *a priori* to complete this task of simplification, and, in thought, eliminate all accidents and irregularities? True, we do not thus obtain the idea of some object superior to reality: the object we reach is rather an impoverished, fleshless, skeleton-like reality. But is it so evident that geometrical figures are superior to reality, and would the world be more beautiful, were it made up of perfectly regular circles and polygons only?

The form and matter, then, of the mathematical elements are contained in the data of experience. The continuity that is measurable in co-existence, succession and displacement, is the object of knowledge *a posteriori*.

True, there remains the link which connects this term with the lower forms of being; the relation of mathematical form, strictly so called, to logical form. But does the mind affirm *a priori* that every fact capable of being explained happens in time and space, and implies the existence of motion? This is doubtful; for we have the idea of psychological facts, as not being in space, and as involving no change of place. Such a doctrine rashly prejudices a question which should remain open to scientific investigation. Indeed, it is by no means inconceivable that movable extension may not be the necessary form of all that is given.

Thus it seems impossible to establish *a priori*,

analytically or synthetically, that figure and motion are essential and necessary properties of being. But will it not be affirmed that the positive sciences themselves testify to this by the demonstrations and discoveries they owe to this doctrine? Is it not by seeking in all things a mathematically measurable element, by taking for granted that figure and motion are everywhere, that physics has been revived, and, more especially, that the mechanical theory of light and heat has been set up? Is not the progress of the various sciences measured by the degree to which mathematical notions are applied to them?

Undoubtedly, considerable probability must be attributed to so fertile an idea; but, on the other hand, one cannot forget its origin. It is experience that has made us acquainted with figure and motion. It has also enabled us to discover these modes of being in a great number of cases, in which we had no suspicion of their existence. Now, experience cannot prove to us that these properties are inherent in all that is. Since it happens that we are more struck by unexpected facts than by ordinary ones, we are inclined always to admit the mechanical substratum we have discovered beneath things which do not appear susceptible thereof, such as heat and light. Nevertheless, there still exist a considerable number of forms which we cannot reduce to motion, and which do not even seem capable of being found in a movable subject. Such are the intellectual faculties. That movable extension is inherent in being, by right of essential and universal property,

remains a hypothesis, in spite of the rôle this idea is capable of holding in science.

Besides, even though it were proved that figure and motion might be found in all that is, it would still not be possible to set up these modes of being as necessary, eternal, and absolute essences ; the mind is plunged into insoluble difficulties when it attempts to develop such a doctrine.

Sometimes, supposing that extension and motion possess limits and form a circumscribed whole, the mind cannot conceive how these limits can exist without a limitrophe extension or an antagonistic motion. For, as regards distant extension or motion, it sees no reason to admit other laws than those governing extension near at hand or present motion. Its function being to affirm of the species what it knows of the genus, the mind judges that one motion can only take place after another, that one extension can only be limited by another. Moreover, even though, in order to avoid progress *ad infinitum*, it recognised a term in regression or in progression, it would not know where to set this term, because, to it, all points in empty space and time are identical.

Again, on the other hand, supposing that extension and motion are limitless, the mind concludes that they are never complete and finished, that they are unceasingly making and unmaking themselves, that they are and are not. Then, however, it cannot regard as absolute that inapprehensible thing which is ever in course of realisa-

tion but never realised, which is neither in the past nor the future but only in the present moment, an infinitely small point between two abysses of nothingness.

Thus, extension and motion are, for being, contingent forms. Consequently, all modes of extension and motion are themselves new and contingent elements as regards lower forms. Is not the production, however, of these modes governed by a law inherent in material essence itself, and is not this law inflexible ?

The fundamental law of mathematical determinations is the permanence of measurable quantity through all the decompositions and recompositions of extension and motion. Its concrete expression is seen in the formula of the *conservation of force*. Is this law necessary ?

We cannot say that it is to be deduced *a priori* from the definition of extension and motion, for these two latter do not appear to change their nature : to increase, the one in magnitude, and the other in speed or duration.

Is it posited *a priori* by the mind as a necessary synthesis ?

Undoubtedly, if we regard measurable quantity as the symbol of a metaphysical essence like active force, it is manifest that the law in question cannot be known *a posteriori*. We are not dealing with anything of this kind, however. Mathematics considers only observable realities ; figure and motion come under the senses. The concept of measure is reduced to that of coincidence, regarded as independent of place, of the meaning of the

figures, and of the way in which they are superimposed ; *i.e.* it is reduced to data that can be explained by experience. In mechanics, force, mass and weight are sensible magnitudes, capable of being measured numerically. The scientific formula of the amount of energy conserved consists of terms devoid of any metaphysical character.

Indeed, it was not all at once that man discovered the first principles of mathematics. He groped about and felt his way, using observation and experiment, abstraction and induction. Certain fundamental principles, now unchallenged, such as the law of the independence of motions discovered by Galileo, at first caused numerous objections to be raised by persons who regarded them as irrational.

Will the suprasensible character of the mathematical laws be attributed to the sign =, which connects all formulæ with one another ?

But then equality, which after all presupposes differences, and as such is distinct from absolute identity, may be regarded as simply a limit, which the mind gradually conceives, by observing objects which show smaller and smaller differences in magnitude and by leaving out of account those that nature inevitably permits to subsist. Now, this process implies no knowledge *a priori*. If we affirmed that the mind intuits the essences it thus creates, if we considered geometrical figures, groups of forces, in their mathematical form, as objects of imagination, we should have to admit that they are known *a priori* by

a sort of metaphysical sense, for experience supplies us with no model of them. If, however, these objects are pictured only in a rough form ; if, in their precise form, they are simply conceived, nothing prevents us from admitting that they are derived from experience elaborated by abstraction.

Finally, will it be affirmed that the principle of the conservation of force is related to the production of motion throughout the universe, that it implies the absolute impossibility of an initial impulsion, and therefore infinitely transcends experience, which can make us acquainted only with a part, a fragment of things ?

Thus understood, this principle would still demand a metaphysical origin ; though it is not so used in the positive sciences. The formula to which we endeavour to bring all the particular laws of motion simply implies the conservation of force in a finite system of mechanical elements. Now, such notions come within the range of experience ; more than this, they can have no other origin than experience itself.

The principle of the conservation of measurable quantity, then, through the transformations of extension and motion, is not imposed by reason on things, or on our knowledge of things : it is but a *résumé* of experience.

But is it not, on this very account, invested with unquestioned authority ? Is it not practically placed in the same category as a principle *a priori* ? Does it not form the starting-point of a strictly analytical development in pure mathematics and rational mechanics ?

The deductive form of these sciences must not deceive us: their conclusions and their data alike are purely abstract. They determine what will happen if certain movable figures are produced and their measurable quantity remains constant. We cannot, without moving in a vicious circle, regard facts as necessary, in the name of a principle whose legitimacy is based on nothing but the observation of facts. Experience, to which the mathematical principle owes its value, itself limits the scope of the principle. We have no right to set up this principle as an absolute truth, and drag it along, so to speak, through all the sciences, and even through morality, blindly overthrowing everything with which it meets. This algebraical formula does not create, or even govern things: it is nothing but the expression of their exterior relations.

Still, even according to this view, does it not render unlikely the existence of the slightest degree of contingency in the production of motion?

One would like to be able to reconcile the two principles, and, at first sight, it would appear as though this were possible. Does the conservation of force exclude a contingent use of this force? If contingency is not to be found in quantity, may it not be found in direction?

This distinction, however, is useless in the present instance; for, in order to change the direction of a motion by the laws of mechanics, either a new motion must be introduced, or one of the component motions

suppressed, *i.e.* the amount of force must be either increased or diminished.

Are we to distinguish motion, strictly so called, the motion of translation, from hidden or molecular motion; and shall we say that the law of the conservation of force really determines the amount of molecular motion capable of resulting from a given motion of translation, and *vice versa*, but not the transformation of the one into the other, and that this transformation, at least, may be contingent?

Molecular motion, however, is, at bottom, only a number of internal motions, which differ from the motion of translation only in being without a resultant. As such, it cannot change into a motion of translation except by a change effected in the direction of the elementary motions, *i.e.* by introducing once more a new force, by an increase or a diminution of the amount of motion.

Are we to restrict the possibility of contingent motion in case the concurring forces determine a state of equilibrium, and say that the introduction of an infinitely small quantity may sometimes suffice to upset the balance, as happens in a case of unstable equilibrium?

But is that ideal equilibrium ever realised? Again, however small the additional force is regarded as being, must it not have a measurable intensity, if it is to produce an effect?

Will it be affirmed that there may take place, in nature, cases similar to the hypotheses of problems which admit of several solutions indifferently, because all the condi-

tions that would be necessary fully to determine the result are not met with in the data ; and that, in these cases at all events, the realisation of one resultant, in preference to the rest, is contingent ?

This would be misjudging the law by which, when there is no reason why one of two opposites should come about rather than the other, nothing results.

Will it be alleged that calculation of probabilities makes conceivable a relative permanence of the *ensemble* in spite of the contingent variability of the details, and that the discovery of the determination inherent in the whole cannot turn against the primordial hypothesis of absolutely fortuitous particular cases ?

But it is not true that particular cases are ever altogether fortuitous. The number of balls contained in a bag, for instance, is an element of determination ; and it is the very existence of this element that involves the existence of a constant mean. As for the apparent indetermination of particular cases, does not this disappear if we admit the existence, in nature, of two kinds of causes : some convergent, permanent and universal, those that produce the law ; the rest, insignificant and fleeting, devoid of convergence, which perceptibly cancel one another and are thus practically equivalent to the chance which the mathematician presupposes. Calculation of probabilities comes under the case of those problems the data of which are incomplete. Now, is not this an artificial abstraction ?

Finally, can we divide the given world and admit that

the law of the conservation of force, a necessary and salutary law, in those cases to which it applies, is after all not universal, and that a portion of the beings in the world are not subject to it? Is it possible to distinguish different sources of motion, some purely material, the rest living or even thinking, and restrict to the former the application of the principle of living forces?

This distinction would seem to be illegitimate if we consider that there are an infinite number of intermediaries between the thought considered as directing and the motion perceived, and that distinct experience never reaches the beginning of a mechanical series. In reality, the doctrine in question conforms to the conditions of a scientific explanation in the one case and is exempt from them in the other. What will be the measure of the force at the disposal of these superior agents, which are heterogeneous as regards mechanical agents? Moreover, where do we find that an amount of force stored away in the nerves produces more work — including the passive work in both cases—than the same amount of force stored away in a purely mechanical apparatus?

In a word, it is impossible to reconcile any degree of contingency in the production of motion with the law of the conservation of force, regarded as absolute. Such a contingency can be conceived only if this law, as regards the mechanical world itself, is not the necessary expression of the nature of things. Now, is such a doctrine really contrary to experience?

We must not deceive ourselves as to the import of the sign = used to express the relation which, by virtue of this law, links together convergent forces and their resultant. In the first place, man can never prove absolute equality. Next, in spite of this equality, the resultant is something new as regards the antecedents. There were several forces; now there is no more than one. These forces took certain directions; the direction has changed. Something was which is no longer; something was not which now is. True, particular and complicated transformations may be reduced to general and elementary transformations and thus appear as necessary, if not in themselves, at least as regards these superior principles. But however simple and immediate be the transformations of motion set forth in the general principles, they always imply an annihilation and a creation. Now, is it intelligible that a motion should be the self-sufficient reason of its own annihilation and of the appearance of a new motion? Can we recognise a link of necessity between what has ceased to be and what is, between what is and what is to come, between being and non-being?

The law of the conservation of force presupposes a change it does not explain, which it would even make unintelligible were it regarded as possessing undivided sway over the primordial modes of matter. It is not absolute, therefore, and has no control over this initial change, which must take place if the law is to apply.

But the various elements, it will be alleged, are simply the qualities of things, they are not their substance: this latter consists of figure and motion, *i.e.* of that very quantitative element whose conservation is affirmed by the mathematical law.

The consequence of this doctrine is to reduce qualitative change to simple appearances, and along with this change, everything nature offers us that is most abstract, without the possibility of conceiving any possible relationship between the immutable element of which the substance of things is made and the qualitative change which becomes the phenomenon thereof.

Finally, of what exactly consists that element the permanence of which is affirmed throughout all qualitative changes?

Is it quantity pure and simple? Quantity is but a measure, an abstraction, an ideal limit, not a reality.

Is it the quantity of several qualities? We can compare with one another only measures that refer to one and the same quality.

Is it the quantity of one and the same quality, which would actually be figurate and movable extension? In this case, which of the two is substance: quantity, which never succeeds in being realised, in obtaining the determination and the fixity it demands; or quality, which imposes on quantity this perpetual fluctuation, so opposed to its essence? Is not quantity subordinated anew to an element of another nature; consequently, does it act just the same as though it existed *per se*?

Even in a quality so elementary as figurate and movable extension, do we find that determination and identity which are presupposed by abstract mathematics? Is not this quality closely linked with the rest, and should it not be connected therewith by imperceptible gradations, just as, in higher regions, physical and chemical properties gradually become united to life? Does not vibratory motion, for instance, represent one of these intermediate stages? Hence, is there perfect identity of nature between all real motions? Are not some more calculated than the rest to produce vibratory motions; and, in that case, does an *ensemble* of component forces form a perfectly homogeneous whole?

To consider quantity with relation to a homogeneous quality, or to leave quality altogether out of account, is to place oneself outside the conditions of reality itself. Everything that is possesses qualities, and consequently participates in that radical indetermination and variability which belong to the essence of quality. Thus, the principle of the absolute permanence of quantity does not apply exactly to real things: these latter have a substratum of life and change, which never becomes exhausted. The singular certainty presented by mathematics as an abstract science does not authorise us to look upon mathematical abstractions themselves, in their rigid monotonous form, as the exact image of reality.

Experience, moreover, however broad its foundations, nowhere shows us mechanical *ensembles* that are altogether

permanent. Even the revolutions of the heavenly bodies, which seem so uniform, do not take place in absolutely identical periods of time. Before the observer, fixed law retreats farther and farther into the distance. He imagines that it would be attainable, could he but observe the whole. But then, in the realms of space and time, what is the whole? The indetermination which inevitably subsists in the mean proportionals, relative to the greatest mechanical *ensembles*, most probably finds its rationale in the contingency of the details.

If, however, general revolutions are extremely slow and almost imperceptible, how must it be with the variations in detail which determine them? For instance, nature, to a momentary glance, seems motionless, whereas in reality everything is moving, living, growing. And if the contingent advance of the mechanical world comes about by continuous transitions, as is probable; if elementary variations, when they do not cancel one another, act by their number, duration, and convergence, rather than by their intensity; one does not see how man, who can only study things with any degree of precision by analysing them, could verify their existence directly. Moreover, there are certain cases in which variations, in themselves insignificant and imperceptible, suffice to bring about considerable results, by a sequence of purely mechanical *contre-coups*. Such, at times, are breaks of equilibrium. The seed that falls from the beak of a bird on to a snow-clad mountain

may occasion an avalanche which will submerge the valleys below.

The appearance, then, of matter and its modes, is a fresh victory of things over necessity: a victory due to the superior importance of matter and also to the elasticity of the tissue of causes and of species, which has enabled this new form to spring and grow up therein.

CHAPTER V

BODIES

Is it possible to create the world without employing anything else than matter and motion? Once these concepts are admitted as indispensable and irreducible data, can everything else be explained?

Above matter, strictly so called, are the physical and chemical essences, *i.e.* bodies, within which figure and motion appear before our eyes. Is the adequate reason thereof to be found in the existence of motion and its laws, or do they contain something more that is incapable of reduction? If it happens that matter does not explain bodies, *a fortiori* it could not explain life and thought.

But why should not matter explain bodies? Here we are not dealing with what there may be relative to man in the idea he forms of physical and chemical objects, nor are we dealing with the subjective element of sensations, but simply with their external cause. Now, why should not the part which things play in sensation be reduced to motion?

Assuredly, it is impossible to regard our states of consciousness as properties of external matter. What

objectively distinguishes bodies from matter cannot be the fact that they are susceptible of sensation. But does it follow that there is nothing more in the substance of sound or of light than in matter pure and simple? Has the descriptive part of physical science no object at all?

If a mode of being need only be set forth in a state of consciousness for no element thereof to appertain to things, then motion itself does not appertain thereto. For it is presented to us only in tactile or visual sensations of which we are aware. If we eliminate touch, motion becomes altogether inconceivable; consequently, nothing could be more obscure than the doctrine which regards motion, according to the immediate idea we have of it, as the exterior element *par excellence*. The motion with which we are acquainted, *i.e.* perceived motion, like all perception, can be nothing else than the sign of the thing given: it is not its image. Nevertheless, if we attribute it to things, we cannot argue that, because consciousness intervenes in the knowledge of bodies, they cannot therefore possess real physical properties.

The objection, however, will be urged, that we must not multiply beings needlessly. It has been proved that the various physical properties all have one and the same external cause, and that this cause is motion. The same agent, applied to the organs of the different senses, produces different sensations; and agents that appear different, if applied to the organ of a single sense, all produce the same sensation. The different physical agents, then, are but varieties of a single one. Moreover, it is known

that sound, heat, and probably light may be reduced to motion. All physical agents, then, are reducible to motion.

This demonstration is not a rigorous one.

In the first place, the law of the mechanical equivalent of heat by no means implies the reduction of heat strictly so called to motion, but simply the existence of a molecular motion in the body which determines in us the sensation of heat.

Then again, if everything is only motion, why does consciousness, in the presence of bodies, experience different kinds of sensations? Are there several consciousnesses differing in nature, corresponding to several categories of motions, and creating qualitative differences, on the occasion of these relatively quantitative differences? But consciousness is essentially one and the same, it cannot understand this passing from the one to the many, from the similar to the diverse. Besides, manifestly we are not here dealing with purely exterior diversity, with varieties of a single type. The sensation of heat is radically heterogeneous from that of sound. Since this heterogeneity cannot find its explanation in the nature of consciousness, it must have its origin in the nature of things themselves, and matter must have the property of assuming forms that cannot be reduced to one another. Now, heterogeneity is foreign to the essence of figurate and movable extension, *i.e.* of real matter. Vibratory motion itself cannot be called heterogeneous from the motion of translation. These are simply magnitudes,

directions, intensities, diverse modes of one and the same phenomenon. It must therefore be admitted that sensible objects, even eliminating that which consciousness may introduce of itself into sensation, cannot be reduced to matter in motion. Disturbed matter seems, in them, to be but the vehicle of superior properties, which are the real physical properties. This new essence consists of our power to supply consciousness with heterogeneous sensations.

If one and the same agent happens to impress the various senses differently, perhaps this is because, though apparently simple, it is in reality complex, and comprises as many distinct agents as it causes diverse sensations. Heat, light and electricity, for instance, may accompany one another, in more or less constant fashion, without on that account being confounded in one and the same agent. Perhaps, also, the fact in question, and along with it the contrary fact, would find their explanation if we admitted that the organs of those senses whose nature is fitted to the sensations they are to receive, retain latent within themselves a certain sum of real physical impressions, supplied by the exterior objects; and that, in obedience to certain stimulations, these impressions pass from latency into manifestation. This is what evidently takes place, for instance, in the case of imaginary sensations and in dreams.

Thus, physical and chemical elements, bodies, in so far as they are capable of heterogeneity, are not interchangeable with matter pure and simple. They cannot

be derived from it along the lines of analytical development, but imply the addition of a new element.

Is this addition the effect of a causal synthesis posited *a priori* by reason ?

Here we are not dealing with the particular concepts that relate to the matter of physical phenomena, *i.e.* to heat, electricity, chemical combination, etc., etc. These properties are evidently known only by experience. But we might perhaps regard as given *a priori* the general form of these properties, *i.e.* the transformation of matter into heterogeneous substances. No sooner is being subjected to the conditions of time and space, as matter is, by definition, than it seems incapable of realising all its potentialities except by a process of infinite diversification. A sunbeam passing through a prism conserves all the light it held only by becoming split up into a thousand different colours.

Thus interpreted, the concept of heterogeneous qualities manifestly presents the characteristics of a concept *a priori*. But it does not enable us to understand why the forms of matter are reduced to a small number of classes, such as sound, heat, or the chemical elements, instead of being infinite in number. Moreover, it takes for granted that everything that is in time thereby assumes a physical form, and this is by no means certain.

The scientific definition of bodies does not imply these metaphysical ideas : it simply contains the idea of heterogeneous material things which come under the

senses, and so it does not transcend the range of experience.

Will it be affirmed that, in defining bodies, the sensible qualities are not regarded as pure phenomena but as properties, *i.e.* as generating causes, and that such essences are of a suprasensible nature?

This would be departing from the scientific acceptation of the terms "properties, affinities, cohesion," etc. These expressions mean simply the uniformity with which, certain sensations being given, certain others are also given. A property is never anything more than an observable relation between two groups of phenomena.

The passing over of mathematical properties to physical ones, of matter to bodies, cannot therefore be regarded *a priori* as imposed on things. But do not things themselves offer us this synthesis as necessary in reality? Can one not say, for instance, that everything that is possesses physical properties?

A great number of things to which there were originally attributed none but properties inferior or superior to real physical properties, for instance, the heavenly bodies and living matter, we now regard as possessed of physical properties superimposed on the former, the mathematical, and implied in the latter, the vital. But does it follow that everything that is possesses physical properties? For instance, is it certain that everything, in man, is corporeal? On the other hand, do we not find science itself, for the purpose of explaining certain phenomena, taking for granted an extremely simple substance, called

ether, which evidently possesses only mechanical properties, and is, so to speak, devoid of real physical properties?

Nevertheless, while it is impossible to affirm that everything that is possesses physical properties, is not the inevitable character of the appearance of these properties, where they exist, sufficiently manifest from the very law which governs this appearance? Are physical properties anything else than transformed motions; and does not this transformation take place in accordance with necessary laws?

There is confusion implied in this reasoning. Physics does not show that heat, in the full sense of the term, is only a transformed motion, *i.e.* that motion disappears to give place to a physical phenomenon which is non-mechanical. It simply shows that, beneath heat, beneath light, etc., phenomena which, to all appearance, are purely physical, there are movements of a special nature, and that these movements are the condition of real physical phenomena. Hence motion is not transformed into heat but into motion of another kind: molecular motion; and it is solely by association of ideas that this motion itself is called heat by physicists. Real heat is distinct from molecular motion; and so its appearance is not explained immediately by the law which explains the passing of the motion of translation into molecular motion.

But do we not find the physical phenomenon constantly being produced when certain mechanical conditions are

realised? Is it not likely that these mechanical conditions are produced by virtue of the mechanical laws; and does it not follow that mathematical necessity itself guarantees the necessary existence of the physical world?

This is a purely abstract deduction; for, as regards real things, absolute necessity is not certain, and there is nothing to prove that the realisation of the mechanical conditions of physical phenomena is not actually one of the cases in which the contingency of motion is manifested. These conditions almost infinitely transcend in complexity every combination that man is capable of imagining by bringing together a finite number of determinate mathematical elements. Thus, the application of mathematics to concrete physics never gives other than approximate results. True, it is thought that if we knew all the mechanical conditions of physical phenomena, we might foresee the latter with absolute certainty. But the thing to find out is whether the concept "all the conditions" corresponds to anything real, whether there exists, for physical phenomena, a finite number of wholly determined mechanical conditions. Afterwards, even if the physical phenomenon could thus be deduced from these immediate mechanical conditions, is it certain that this could be done for the conditions themselves, and so on indefinitely? Could we be sure that, in the regressive series of mechanical causes, there is nowhere to be found the slightest deviation?

This hypothesis might seem gratuitous if motion

everywhere offered the same appearance, and never existed except for itself. But whereas in the case of ordinary mechanical phenomena, motion, the manifestation of a resultant, is purely and simply a change that has come about in the relations in which several extended masses are placed, in those cases with which we are here dealing, motion, hidden away within the folds of matter, remains without a resultant, but sustains new and superior properties. Whilst relatively simple in the former case, in the latter it is almost infinitely complex. Moreover, it is impossible to conceive how any motion whatsoever could find its all-sufficing reason in another motion ; a very slight variation in elementary motions might suffice to bring about considerable changes in far-distant consequences. If this is so, is it not likely that there is an element of contingency in the production of the mechanical conditions of physical phenomena, and that the appearance of these latter, even though they may still be uniformly linked to their mechanical conditions, is itself contingent ?

The physical world, as such, also has a law of its own. Phenomena do not happen by chance. If this law is absolute, the intervention of the physical in the mechanical world, contingent as regards this latter, will be governed by an inner necessity proper to the physical world itself ; and consequently, that which was partly indeterminate from the strictly mathematical point of view will appear as wholly determinate when we take account of the purely

physical actions which influence the course of mechanical phenomena. Thus the planet Uranus seemed to be wandering through space by chance, so long as nothing was known of the existence of Neptune.

But how are we to determine the law proper to the physical world as distinct from the mechanical world? Positive science is more and more relinquishing the descriptive point of view, which is incapable of supplying precise data, and, as far as possible, is reducing physical phenomena, which are relatively qualitative, to mechanical phenomena, which are relatively quantitative. For instance, it does not study heat itself, but rather heat in its mechanical equivalent. It likewise seeks after the mechanical equivalent of electricity and of the other physical agents. And so, to mathematics falls the task of determining scientifically the law of physical phenomena.

If the parallelism presupposed by this method is absolute, there can be no question of a contingency proper to the non-mechanical element of physical phenomena: the mechanical physical law supplies the exact measure of the strictly physical law. Now, is the mechanical order literally implied in the physical order, its equivalent?

In one sense, the expression "equivalence" may be a perfectly legitimate one: it may be true that any physical phenomenon, regarded separately, is always accompanied by a certain mechanical phenomenon. In this sense, however, the mechanical equivalence of

physical phenomena cannot supply the law fitted to these latter, because we have to discover whether there is not action and reaction between the two orders of phenomena, and whether the strictly physical element does not act upon the mechanical element.

For the mechanical law to be regarded as the translation of the strictly physical law, there must be equivalence not only between the two orders of facts, but also between the two orders of relationships, between the concatenation of physical facts and that of their mechanical conditions. Now, this second equivalence would seem to be unintelligible, because, whereas the variable is homogeneous, the element which must be a function thereof is heterogeneous. Motion is susceptible of changing continuously; it is not so with the transformation from one physical or chemical state to another. What are the intermediate physical states between the electric state of the poles of the battery and the luminous state of carbon? Can strictly physical states vary as little as we wish, like their mechanical conditions? Lastly, are there not cases where the parallelism seems actually violated, as when the addition of a slight amount of motion transforms a chemical phenomenon into a luminous one and the latter into a calorific phenomenon, or causes a body to pass from one state to another, *i.e.* suddenly produces quite a new phenomenon?

Thus there is no complete equivalence between the order of strictly physical phenomena and that of their

mechanical conditions ; and the law of the one set of phenomena is not prejudiced by that of the others.

In order to judge of the inner necessity of the purely physical world, we are thus brought to examine it in itself, *i.e.* to lay aside the mathematical part of the physical sciences and consider their descriptive part. Manifestly, from this point of view, we cannot reach precise results analogous to those obtained by considering solely the mechanical phenomena involved in physical phenomena. Apparently, however, mathematical science is not the only type of knowledge. According to this view, then, what will be the law of the physical world ?

In spite of appearances, it is not likely that the heat which manifests or disappears, when a motion of translation changes into a molecular motion, and *vice versa*, springs from nothing or is reduced to nothing. It may be admitted that there exists a latent state, if not of mechanical heat (which is nothing but molecular motion) at all events of the physical heat superimposed ; and that the physical heat remains in this state, when it is not sensible. In a word, the physical world persists like the mechanical world. The same agents subsist with the same properties ; and the amount of chemical matter remains perceptibly the same. We may then ask ourselves whether there is not, within the physical world, a principle of necessity which consists of the persistence of physical action itself ?

It may seem, at the outset, that by admitting this law, all approach to contingency in the physical world is not

shut off. Undoubtedly this law implies the equality of the consequent state with the preceding one, from the physical point of view; but it does not immediately require that the passing from the latter to the former should be necessary; it determines the intensity, not the mode, of the phenomena; it measures the force, but does not state how it is to be used. May we not then regard the law as simply setting forth the condition under which otherwise contingent transformations take place?

For change of state, however, to be explained physically, one or more physical circumstances must be added on to the given conditions, or certain of these conditions must have disappeared; this presupposes the disappearance of a certain amount of physical action. Modes are but vague abstractions, unless they are of a certain intensity. In vain then should we look to the physical world for marks of contingency if the persistence of physical action were to be admitted absolutely. But is this law evident?

First, it does not even result from the definition of physical phenomena, since the idea of a potentiality of change existing in the body manifestly does not determine the intensity of this potentiality.

Second, it cannot be referred to a synthetic principle *a priori*, since it is relative to a form of being we should certainly never think of, were we confined to pure reason.

If it is necessary, this can be only a necessity of fact, established by experience and induction. But from

this point of view also, probability is on the side of contingency.

No doubt the theory of latent states is a plausible one, if it is not admitted that strictly physical states are metamorphosed motions. It guarantees but imperfectly, however, the equality of the antecedent and consequent physical actions. Indeed, it is improbable that a latent state should involve the same amount of action as the corresponding manifested state. True, one may suppose that, whilst some physical property is passing into the latent state, some other is being manifested, and *vice versa*, and that, in this way, equilibrium is maintained throughout the universe, by a process of perpetual compensation. But this hypothesis on the totality of things transcends the field of experience. By it, we cannot even know if the totality of things is a finite quantity.

In itself, the law of the conservation of physical action is but ill suited to experimental verification. It implies a unity of measure in the real physical order. Now, the reciprocal heterogeneity of physical states is opposed to quantitative comparison. The amount of change is greater than that of permanence, because the qualitative element now has an important part to play. The most elementary and general physical and chemical laws set forth relations between things so heterogeneous that it is impossible to say that the consequent is proportionate to the antecedent and thus results from it, as effect results from cause. The common fundamental element between antecedent and consequent, the condition of necessary

conjunction, almost completely eludes us. Here we have only conjunctions given by experience, and which, like it, are contingent.

Thus it may be admitted that there is something contingent in the fundamental relations of real physical phenomena ; and, if the laws proper to the mechanical world are not absolutely necessary, it may be conceived that physical agents so intervene in the course of mechanical phenomena as to bring about the conditions of their realisation or of their contingent variations.

If this is so, the physical world is not immutable. The amount of physical action may increase or diminish throughout the universe or in parts of the universe. Indeed, is not this what seems to have taken place all down the centuries, if an elementary cosmic matter, almost as uniform as space itself, has gradually become aggregated so as to form stars endowed with light and heat, and that from these stars has come an infinite variety of bodies, ever more rich in physical and chemical properties ? Is it not the opposite of this which seems to be taking place beneath our very eyes, if indeed certain stellar systems are gradually losing their brilliancy and their heat, and advancing to a state of dissolution which will bring them back to indiscriminate dust ?

And, if like revolutions take place in certain parts of the universe, who can affirm that there happen elsewhere exactly contrary revolutions to restore the balance ?

The particular laws appear necessary because they necessarily come under the general laws ; but then, if

the most general laws, the framework of the particular laws, are capable of even the slightest variation, the entire edifice of destiny crumbles away.

The totality is but the sum of all the details. The form of the whole can be contingent only if there is an indeterminate element in the parts. But if the contingencies of the general laws occasion only feeble variations for immense masses during considerable periods of time, how should the elements of these variations appear to the experimenter who operates for a few moments on a few particles of matter?

CHAPTER VI

LIVING BEINGS

If we pass without a break from the study of inorganic bodies to that of the higher types of the animal and vegetable kingdoms, we do not see how the former could produce the latter, and we refuse to believe that the physical and the chemical laws suffice to explain physiological phenomena. But when, descending the scale of living beings, we gradually find functions becoming blended, organisms simpler, and conformation more fluctuating or uniting with geometrical figures ; when, finally, we come to those rudimentary beings intermediary between animal and vegetable, or rather which so far are neither animal nor vegetable and scarcely consist of more than a homogeneous and shapeless mass of albuminoid matter wherein life is manifested only by the process of nutrition ; or again, when, going back to the phases preceding the perfect state of superior beings, we find a certain analogy between these phases and the permanent state of inferior species ; when we see the most diverse organs originate in parts almost exactly alike, and these very parts become identified with and finally reduced to a microscopic element consisting solely

of a solid layer, a soft layer, and a liquid layer : then we may ask ourselves whether the living world, in its inferior extremity, at all events, is not connected with the inorganic world ; and whether the simple play of physical and chemical forces is incapable of producing complex organisms, perhaps not immediately, but first, the elementary living matter, and then, through that matter, the entire hierarchy of organic forms.

Moreover, on analysing the principles of life, we appear to find therein no single element which does not already exist in the inorganic world.

The albuminoid matter of the cells consists mainly of carbon, oxygen, hydrogen and nitrogen. As regards the manner in which these elements combine and the extreme instability of the organised body, these characteristics may be explained by relations of number, weight, form, and position, by the mode of molecular motion, or even by some physical property of one of the components, carbon, for instance, a property which, usually latent, would here manifest itself by reason of the special conditions in which it is placed. In inorganic chemistry, do we not find that the most varied compounds result from a combination of the same elements, used in different proportions ?

The functions of the cells also have their analogues in the inorganic world. They produce new cells by converting elementary substances into protoplasm. At first, in the cells that are not yet supplied with membranes, this conversion takes place without intussusception :

now, a crystal placed in a solution of a chemical nature identical with its own, in the state of supersaturation, causes the salt contained in this liquid to crystallise. The cells assume fixed forms and thus become differentiated: it is the same with the crystals, which may differ in form without differing in chemical composition; we find some of them which, when slightly impaired, regain their form if placed in the proper saline solution, though at the expense of this solution itself.

Finally the cells combine and form systems, just as droplets of mercury blend in one large drop.

It would therefore seem as though, between the living world and the physical world, there were only a difference of degree: a greater diversity in the elements, a greater power of differentiation, more complex combinations.

Does the observation of living beings, considered from the standpoint of their actual nature, wholly confirm these inductions founded on their genesis?

One thing is to be noted, that while, in the mathematical world, movable matter at first seems posited anterior to motion, and, in the physical world, simultaneously with motion; here, appearances themselves show us motion posited as anterior to the corresponding matter, change as preceding being, organising work as preceding organism. The word "life" signifies "automatic motion" above all else. The living being is in a state of continual transformation: it feeds itself, develops, produces other beings; it is of unusual imper-

manence and flexibility. A drop of water threatens its existence; it is modified in every way; it employs innumerable devices to enable it to pass unimpeded, if possible, through the numerous shoals with which its path is strewn. There is a striking disproportion, in the living being, between the rôle of function and that of matter, whatever be the origin of function. Life, even with a more restricted number of elements than that used by physical force, produces far more powerful results, seeing that a blade of grass can find its way through a rock.

In what does the vital act, organisation, consist? Evidently it is not sufficiently defined by the term combination. It does not consist in the formation of an aggregate analogous to a piece of sulphur or a drop of mercury, but rather in the creation of a system wherein certain parts are subordinated to certain others. In a living being, there are agent and organs, a hierarchy.

Is there adequate reason for this hierarchical order in the property, possessed by the anatomical elements, of acquiring forms different from one another? Undoubtedly not, for differentiation must not take place by chance, if certain parts are to be subordinate to the rest; the cell must act differently from purely chemical matter, which matter, in all the various forms it assumes, does not succeed in creating hierarchical systems.

But perhaps this appropriate differentiation is explained by the different conditions of production and existence of the different cells. Still, the cells must be capable of

appearing and subsisting in the exact conditions demanded for determining differences of value. Such flexibility is not found in inorganic matter.

Finally, can we say that the principles which explain all organisation are the inner conditions, the chemical composition of elementary materials, *i.e.* of cells? The cell, however, supposing every living element to be reduced thereto, is a being which actually possesses, to some extent, the very characters which have to be resolved into physical properties: the hierarchy of the parts and the power to create new cells, between whose parts the same hierarchy will be set up. In the cell, protoplasm is a controlling part. It creates the liquid nucleus and the rigid membrane, and so gives birth to a distinct being, until, in its development, it produces other beings which, also, will make for themselves a separate existence. The reduction of organisms to cells simply postpones the difficulty.

In a word, vital function seems to be a creation, without either beginning or end, of systems whose parts show not only heterogeneity but even a hierarchical order. The living being is an individual, or rather, by continual action, it creates for itself an individuality and produces beings themselves capable of individuality. Organisation is individualisation.

Now, this function does not seem to exist in inorganic matter. Chemical substances, however compound they may be, offer only similar parts for mechanical division, and consequently do not admit of differentiation, division

of work, and a hierarchical order. There are no individuals in the inorganic world, nor is there any individualisation. The atom, if it exists, is not an individual, for it is homogeneous. A crystal is not an individual, for it is divisible, perhaps indefinitely, into similar crystals actually existing. Will it be said that the heavenly systems, consisting of a central star and planets dependent thereon, offer us the analogy of individuality? True, these systems admit of a kind of apparent hierarchy; they are not, however, like living beings, decomposable, as regards their ultimate elements, into systems capable of individuality. Physical force would seem to be attempting, in the infinitely great, what life realises even in the infinitely small. It can, however, attain only to an external resemblance.

Thus the living being contains a new element, one incapable of being reduced to physical properties: progress towards a hierarchical order, individualisation. The relation, then, between physical properties and vital functions is not immediately necessary, as would be the case if the latter were previously contained in the former. Still, even as a link between things radically distinct, this relation is necessary if affirmed in a causal synthesis *a priori*. Now, is this so? Is the concept of life built up by pure understanding?

If we mean by life a simple immaterial principle, which co-ordinates means with a view to an end, the idea of life cannot originate in the observation of living beings. For we do not find that these ever possess absolute

unity. True, they are organisms; but their parts are themselves organisms, gifted, to some extent, with a life of their own, until we come to the cell, which, on splitting up, produces several cells, and, consequently, is not radically a unit. The idea, likewise, of organic finality certainly does not come from experience, which undoubtedly shows us organisms in harmony with their functions; it does not, however, tell us whether the organ was created with a view to the function, or whether the function is simply the result of the organ.

And so the idea of a vital principle, single and intelligent, is really an idea *a priori*; but this idea is in no way presupposed by the knowledge of living beings. If it can be admitted, it is as the metaphysical interpretation of facts, not as the starting-point of experimental research. We do not see what help can be given in the direction of the scientific observation and explanation of phenomena by the concept of an essence which is not of the same kind as themselves, and which, therefore, could not supply a rule applicable to the cases supplied by experience. These transcendent principles, applied to science, are liable to warp and hinder observation.

Biology, however, is at all events dominated and controlled by the two following ideas. In the first place, life is the realisation of a type, and, as such, is a connecting link between the parts: when one organ is given, the connected organ should also be given, even though it is in a rudimentary state. The living being is

a whole. Afterwards, life is one common activity and the organs are constructed so as to be able to contribute thereto: there is correlation between their functions, and, consequently, between their forms. According to this view, the living being is a harmonious system.

True, these two principles are implied in biology, but they do not transcend the range of experience, and it is this science that has revealed them. Unity is here conceived as a constant relation of juxtaposition, and harmony only as a reciprocal influence.

The conjunction or link, moreover, is regarded as absolute neither in the law of connections nor in that of correlations; the more so as each of these laws, taken absolutely, might injure the other. The conservation of the type might necessitate the existence of organs otherwise useless; the conservation of the individual might necessitate derogations from the typical form.

And so life, regarded as a totality and a harmony, as a static and dynamic unity, is not the object of a notion *a priori*. The relation connecting it with physical properties is given by experience and shares its characteristics.

But, even if this relation is not necessary in theory, may it not be maintained, from the standpoint of experience itself, that it is necessary in fact? Is there not life everywhere in nature; and does the immobility of inorganic matter differ from torpor and sleep? Since this matter is transformed into living substance, must it not actually share in vital properties?

Doubtless this theory may be upheld if we pervert the definition of life, and reduce it, for instance, to the idea of simple growth and conformation, properties actually inherent in so-called brute bodies. Considered as a whole, however, both in its form and in its matter, life, or the creation of a hierarchical order between parts, does not appear in the purely physical world. This world offers us nothing analogous to a cell. Shall we be told that life is there found in a state of potentiality, and that it is only awaiting favourable conditions to become manifest? It is precisely manifested life, however, with which we are here dealing. For while manifestation may be a matter of indifference to the logician, who considers only concepts, it is the main thing to the naturalist, who considers things themselves.

Nevertheless, for the appearance of life to be regarded as necessary in fact, is it not sufficient that this appearance always comes about if certain conditions are realised?

Here we are considering none but purely physical conditions. It would be arguing in a circle to deduce life, even heterogenetically, from actually organised matter. To maintain this doctrine, one must be able to affirm that the conditions amid which life constantly appears—if it is true that life thus possesses invariable antecedents—are purely physical, both as regards their elements and their mode of combination. Nor is this all. As a state of things, in itself purely physical, may be the more or less distant result of an extraneous intervention, which, after effecting in the order of phenomena a

greater or less deviation, would have allowed things to resume their normal course, it must be proved that the conditions in which life has manifested itself have been brought about, however far back we go in the region of causes, by purely physical circumstances. A laboratory experiment would not suffice to demonstrate the physical origin of life, because we should have to find out if the physical world, of itself, is capable of creating conditions analogous to those set up by an intelligent experimenter.

The living matter, too, whose appearance is thus to be explained, is not simply some particular non-organised organic product, such as urea, ethers, sugars, alcohols, acetic acid, formic acid, etc.; it is the simple active body, the element capable of assimilation and of dis-assimilation, protoplasm, that creates for itself both envelope and form, becomes a cell, grows and develops, and produces other cells. For manifestly the living being possesses the faculty of creating products which are not living like itself, and of doing acts partially and even wholly physical or mechanical; just as the physical and chemical world produces a multitude of purely mechanical phenomena. The whole of a cause is not necessarily found in its effects. Even though the organic product, the origin of which had been explained physically, happened to be one of those to whose formation life, as such, contributes nothing, and which are but a distant and purely mechanical consequence of the vital impulsion, it would be illegitimate to extend this

physical explanation to all physiological acts without exception.

Finally, these difficulties overcome, it remains to be shown that, the cell being given, all living beings are also implicitly given, *i.e.* all spring from the cell by a law of necessity ; that the most complex structures and functions find their all-sufficient reason in this elementary organism.

Now, all these demonstrations would seem to transcend the range of experience. How are we to trace back or connect, by a necessary link, the physical conditions of living beings, mainly superior beings, to the phenomena of the purely physical world ? How are we to prove that physical phenomena are nowhere turned aside from their proper course by superior intervention ? Manifestly, from the point of view of complexity, there is considerable disproportion between the highest inorganic bodies and even the most elementary organised bodies. Besides, this singular physical complication coincides with the presence of new qualities of quite a different order and certainly more perfect. Is it not probable that the revolution which has taken place in unorganised matter in the forming of these unexpected combinations has actually been determined by superior essences ; that life has itself laid down its physical conditions ? According to this doctrine, there would indeed be a relation of cause and effect between physical conditions and life, but it is life that would be the cause.

Moreover, it is unnecessary to state that the influence

of life makes itself felt suddenly, whereas progress comes about intermittently. The action of the superior principle may be more or less imperceptible to the man who considers moments of evolution very near each other. It may seem, then, that the physical forces are acting alone. It may also be conceived that, in certain cases, the superior principle leaves to the physical forces, so to speak, the task of completing, by themselves, what it has once prepared, when these forces are adequate to this object. In such cases, the passing from the conditions to the conditioned would be purely physical, even though life, as such, were a special principle.

If this is so, the elements, which form the matter of life, are exclusively physical and chemical forces ; but these materials do not remain raw or unelaborated : they are ordered, harmonised, disciplined, as it were, by superior intervention. According to this view, life is a genuine creation.

Still, if life is not chained down to physical agents, does it not in a way contain necessity within itself ? Does it not obey special so-called physiological laws, which leave no room—or but little—for contingency ?

Is there not exact correspondence between the physiological and the physical phenomena ? Consequently, is there not, within the living world, some principle of conjunction analogous to that in the physical world ? And, although life may not be a physical phenomenon, is not that element of contingency which it recognises

exactly measured by that which the purely physical world admits ?

No doubt it is probable that every physiological modification is connected with some fixed physical modification. Still, while it is difficult to compare with one another the physical phenomena, from the standpoint of quantity, and we are compelled, when seeking a scientifically determinable element, to gauge or measure its mechanical conditions, is it not even more difficult to find a physiological unity of measurement, which will enable us to set up a correspondence between the living and the physical world, as regards the respective relations of the phenomena of both orders ? How are we to reduce the diversity of forms and vital functions to one and the same specific unity ? And yet the respective variations of two quantities must have been measured, for us to be able to regard the one as a function of the other.

Moreover, is not life frequently a struggle against physical forces ; and could this phenomenon be conceived if the vital functions were no more than the simple translation of the physical phenomena into another language ?

In short, is there not an infinite disproportion, especially in superior beings, between the physiological changes and the corresponding physical changes ; for instance, between the physiological transition from life to death and the physical conditions of this transition ? If every malady is a modification, not only physiological but also physical, is this modification, which is disorder from the

standpoint of life, also disorder from the standpoint of matter?

We cannot argue from the correspondence existing between the vital and the physical phenomena, and say that the former possess the degree of necessity that subsists in the law of the latter. If the order of the vital phenomena is necessary, it is in themselves that the reason and measure of this necessity abide.

The essential laws of life seem to be, like the physical and mathematical laws, an appropriate expression of the formula: *Nothing is lost, nothing created.*

The law of organic correlations presupposes, between the partial functions and the total function, a relation analogous to that between concurrent forces and a determinate resultant. If one of the concurrent forces is modified, the resultant can remain the same only through correlative modifications experienced by the other concurrent forces. In physiology, likewise, if a partial function is modified, the rest will also be modified, so that the total function remains possible. The law of correlations may therefore be reduced to a simpler law: the permanence of the total function throughout all the changes which the partial functions may undergo.

The total function, however, is not only an end in itself, it is also the means by which there is realised either a certain form or a certain organised matter.

Now, organic form and matter would also appear to have a law of their own.

With form there is connected the law of relations. This law, which has for its corollary the balancing of the organs, presupposes, between the partial forms and the total form called the type, a connection analogous to that between partial volumes and a determinate total volume. If one of the partial volumes is modified, the total volume is capable of remaining the same only if the other partial volumes are correspondingly modified. In physiology, likewise, if one organ is modified, the rest will be, not suppressed, but modified also, so that the type may be preserved. Thus, the law of relations is reducible to the permanence of the form or of the type.

What connection have these two laws to each other ?

If the law of relations were absolute, *i.e.* if form existed for itself, this law, in certain cases, might go against the law of correlations, by necessitating the presence of organs otherwise useless. But, if form exists only as the result of functions, if the law of relations is subordinated to that of correlations, the organs must tend to follow the variations of the functions, to decrease in proportion as these weaken, to atrophy when they disappear. Now, this is exactly what happens ; and so we may grant that the law of relations, after all, comes under that of correlations.

In short, the production of organised matter seems to be subject to a law analogous to that of crude matter. There would seem to exist a determinate quantity of living matter, which quantity remains invariable, throughout the vital vortex. Perhaps, indeed, assimilation and

disassimilation balance each other in a sufficiently large totality. The wider the bases on which statistics work, the more constant, the nearer to equality, are the averages they give for births and deaths. Even in the case of the individual, old age and youth under normal conditions seem to balance each other: decadence comes along and restores the equilibrium which growth had broken.

This law, regarded absolutely, still seems radically distinct from that of correlations, because it may imply or exclude functions otherwise useless, or else necessary from the standpoint of general action. But, if we admit that organised matter exists only by virtue of the organising act itself, the law regarding its production also comes under the law of correlations.

In a word, the first of these three laws is the best established and the most permanent; and if perchance the other two seem to oppose it and exist for themselves, we may admit that these divergencies, in the final analysis, are due to lack of unity and homogeneity in the total function; to the blend, in more or less unequal proportions, of diverse modes of organisation.

The supreme law of the living world would seem, then, to be the permanence of the total functions, *i.e.* of the degree of organisation, and consequently the permanence of the types and of organic matter itself; in a word, the conservation of life.

Can it be maintained that this law does not imply the absolute necessity of biological phenomena, by pleading

that the conservation of vital energy does not prejudice the mode in which this energy is employed ?

This interpretation of the law of conservation seems to be based on physiology scarcely more than on physics or on mechanics. Things are never given except in a determinate form, and their determinations and mode of employment may be modified, according to the law of conservation itself, only by the intervention of new conditions of the same order, which would lower the average, did they not originally form part of the same system.

The problem of the necessity of laws, so diverse in its applications, remains identical in its general form. In physiology, as in physics or mathematics, we are compelled to state it as follows : Is the permanence of the given quantity necessary ? Now, as regards life, what answer are we to give to this question ?

We cannot rely on the definition of life itself to affirm that there is necessarily maintained the same amount of vital energy throughout the universe ; for this definition leaves indeterminate the number of living beings and permits of a very large number of degrees of organisation.

Nor can we invoke a rational synthetic principle, enabling us to build up physiological science *a priori*, for the impossibility of such a structure is evident ; and the terms composing this principle, though apparently metaphysical, would never, from a scientific point of view, be anything more than experimental data.

It only remains for us to consult experience itself, and see if it really guarantees the permanence of the amount of life. This does not appear to be the case.

Vital energy—even reduced to such experimental data as the complexity of organism, or division of labour, anatomical form, and the properties of organised matter —is a thing almost impossible to calculate. Into this concept there enters an idea of quality, of perfection, which does not seem amenable to number. Indeed, one could not say that the amount of vital energy would remain constant, if, the same number of cells being retained, complex organisms all made way for rudimentary ones.

Besides, while a great number of facts really manifest the permanence of functions and organisms, it must also be recognised that other facts seem to imply more or less profound physiological variations. Is it not in the power of man to modify, more or less, certain vegetable and animal species and produce in them permanent varieties? Does not the possibility of even an artificial education show that functions and organs, in their essence, do not imply absolute immobility, and that consequently the amount of life, while remaining sensibly the same in its totality, does not remain so necessarily?

And if we consider living beings left to themselves, does it not seem as though, in certain facts, such as the existence of rudimentary and actually useless organs, the disappearance of certain species, the increasing perfection of the fossils in soils of ever more recent formation, we

were brought in contact with a force making for change, decay, or progress, remaining deep within nature herself, alongside of and at the root of the force making for conservation ?

This variability exists, we shall be told, but it does not imply any contingency whatsoever ; it leaves necessity still subsisting. Not that it has its origin and basis in the laws of the inorganic kingdom : the latter supplies only the materials and conditions of organic development, and this development has its cause in the distinctive nature of living beings themselves. Self-modification, however, so far as the nature of the organism will allow, by setting itself in harmony with the environment in which the organism has to live, and preserving, accumulating within this latter, and even handing over to its descendants the modifications that have thus come about, is a law inherent in all organisms. In living beings, there is an hereditary power of habit and of adaptation. They are subject both to permanence and to change, a necessary change determined by an immutable law of accommodation, and are fixed in habit, which also is fatality. These two laws explain all organic variations that have been or may be realised. They assign to each of them a constant antecedent ; so that the greatest transformations would seem fully determined, if we but knew all the circumstances in which they take place. Thus, necessity has sway both in the living and in the inorganic world. The only difference is that in the latter the fundamental law is one of essential identity, and in the former one

of radical change; in the one a static, in the other a dynamic law.

Is it admissible that a radical variability should be one with a necessary concatenation?

If it is an unfounded assumption to maintain that change, which is a sign of contingency in the inorganic world, is but an illusion, and that the mathematical formula which remains the same amid all the variety of phenomena is the only reality, it is an equally unfounded assumption to reduce change to necessity, when, matter being scarcely anything and act becoming almost everything, we dimly feel we should be releasing our hold on reality itself, did we persist in regarding change as wholly phenomenal. The formulæ by whose aid we expect to demonstrate the necessary concatenation of biological phenomena are less exact than those which set forth the conservation of a given amount of mechanical force. Calculation applies but inadequately to measuring flexibility and habit, and we do not see how, on such foundations, we could establish a deductive science indicating really necessary relations between facts. In reality, these principles, which are made to appear as necessary laws by flinging them violently into the mould of mechanical and physical formulæ, lack the conditions requisite to constitute a positive law or a constant relation between facts; they express relations of another nature.

According to the law of adaptation, the living being becomes modified in such a way as to be capable of subsisting in the conditions in which it finds itself.

Now, the concept "in such a way as to" is somewhat indeterminate. From the positive point of view, there may be several ways of realising an end set forth with given materials; the method is a matter of indifference, provided the end is realised. True, according to the number or nature of the conditions, the number of the methods between which a choice may be made will be increasingly restricted. But the expression "in such a way as to" is less correct the more our choice is limited; it would lose all justification did it remain no more than a possible expedient; for then it would be simply by virtue of the conditions stated that the phenomenon would be realised: the idea of the result to be obtained would no longer intervene as a determining condition.

If now, taking into account the considerable number of means implied in all finality, we invoke, in explanation of the preference given to some one of them, such considerations as the principle of lesser activity, or the instinct of beauty, or the general good, we leave the ground of positive science to pass into that of metaphysics or æsthetics, and are no longer in a position to allege the authority of experience.

Nor is this all. The concept "in such a way as to" sets up a bond between the conditions in which a living being finds itself, on the one hand, and the continued existence of this being in these conditions, on the other hand, *i.e.* between things that are given and one thing that is simply possible. Now, the ideal character of this second term still prevents our admitting that the law of adaptation

is a truly positive law, and implies necessity in the sense in which the laws of physics or chemistry may imply it.

In short, the concept "exist" itself leaves room for some degree of indetermination. A complex being has several modes of existence, according as it develops such or such of its faculties in greater or less degree. Harmony itself may be interpreted in several ways, according as all the faculties are placed on the same level, or certain are placed above the rest. Which, of all these modes of existence, is the one that will constitute the aim and object of adaptation?

Nor does the principle of hereditary habit satisfy the conditions of a positive law. According to this principle, purely accidental modifications may, under the influence of certain circumstances, such as physical environment, the struggle for life, sexual selection, and, in the last analysis, the energy, continuity, or repetition of certain acts, become at last essential and pass over from the individual to the species. Without examining the nature of the circumstances mentioned as determining habits, and which are probably not all purely physical, it may be remarked that habit is not a fact but rather a disposition to realise certain facts, and consequently can find no place in the formula of a positive law.

In addition, habit is here regarded as bringing about a modification in the very nature and essence of the individual. Now, the real positive laws are relations which spring, in the final analysis, from the nature of things, considered as constant. They do not precede

beings, but simply express the consequences of their reciprocal action. Undoubtedly, in scientific demonstration, they may be considered as governing facts of detail, in so far as they are linked to the nature of beings, *i.e.* to general facts ; but they really remain subordinate to general facts, which are their basis. To admit that the most general facts themselves vary is to admit that laws vary ; or rather, if we think we possess a law which explains these variations themselves, it is no longer a positive law, since it is stated anterior to all the facts. The only means of justifying the assimilation of the hereditary habit to the positive laws, would be to trace back the formation and conservation of this tendency to the more general laws of physics and chemistry. In this way, physiological variability would be based on a relatively permanent foundation. Presented apparently anterior to the phenomena, in so far as these latter would be regarded as strictly physiological, this law would, in reality, be subsequent to their fundamental conditions, in so far as the physiological phenomena came, as a particular case, under the heading of the physical phenomena. The very object of the hereditary habit, however, is to make up for the inadequacy of the strictly physical laws in physiology ; and indeed, the property it sets forth is directly opposed to the fundamental principles of physics and chemistry, by which the nature of a body is determined once for all. No doubt one particular case may be the negation of another particular case, as such, though not the negation of the general

case itself. It is therefore as a strictly physiological law, and a fundamental one, that the hereditary habit should help in explaining the living world; and according to this view it cannot be regarded as a positive law.

To sum up, the mode of organisation seems to vary, not only in the individual, but even, to a certain extent, in the species. These variations are not a matter of indifference, they constitute either a decline, or, more frequently perhaps, a development. We may therefore reflect that the quantity of life does not remain constant throughout the universe, and that the nature of physiological phenomena is not wholly determined by the laws proper to them.

And, indeed, if the concatenation of real physical phenomena, which are the conditions of physiological phenomena, is not inevitable, is it inadmissible that the living world should gain by this indetermination, that organised beings, self-endowed with a certain degree of mobility, with the power to develop and progress, should come to profit by these gifts of nature and expand in every direction, by reason of the very elasticity of the fabric of physical conditions?

Moreover, it is possible to conceive that the intervention of life in the course of physical things may not be sudden and violent, but imperceptible and continuous; so that it is practically impossible to determine exactly where physical phenomena cease to exist solely by and for themselves, and begin to be elaborated by higher forms, whose instruments they become.

CHAPTER VII

MAN

It is a rule in science to suppose the fewest causes possible, and, when we meet with new facts to be explained, to compare them with already known causes, in order to see whether they depend thereon, before admitting the existence of a new cause. Now, once in possession of the concepts and laws of being, genera, matter, bodies, and life, is not the mind in a position to explain everything, and has it not completed the list—already too long—of the postulates of science?

Everything the world offers to the mind is capable, indeed, of being explained by these principles, if man can return to them. For, apart from the forms of being to which they immediately apply, there is no other object than human nature given in experience.

Undoubtedly our first feeling is that there exists a radical difference between man, endowed with reason and language, and all other living beings. Do not comparison and induction, however, invalidate this belief? Do we not find human nature, both in past and present, showing forth a series of degradations which assimilate it to the lower beings? May we not say that, in the

highest human being, the qualities we admire, if we inquire into their genesis, do not appear as irreducible qualities, but rather originate in simpler faculties, and are finally reduced, in accordance with a natural law which it is perhaps not impossible to conjecture, to elementary powers inherent in every living being, such as the faculty of response by automatic reflex action to the influence of external things? Is sensation anything else than the clash of external influences against our own tendencies, more or less incompletely adjusted to these influences? Does it not disappear when adaptation is complete, as in habit, or when excitation is very feeble, as in sleep? Is thought anything more than the inner reproduction of outer phenomena, classed according to the constancy of their relations? And is not this reproduction the product of the phenomena themselves, which come one by one and make their stamp on an impressionable surface sufficiently firm to receive and retain it. In short, is will anything else than the totality of our tendencies, whether original or acquired, entering into activity under the influence of an outside stimulus, and setting their mark on things in their turn? Is the consciousness of free will anything different from the sense that we ourselves are the cause of our own actions—a well-founded sense, for our tendencies are ourselves—added to the perception that there is conflict between our desires, and to our ignorance of a portion of the causes which determine the issue thereof?

All psychological activity, then, seems as though it

might be reduced to reflex action. But does not this latter actually exist in the physiological world? Is not reflex action the function of all organisms? Especially in higher organisms, is it not subject to strange complexity, co-ordination, and the power of adaptation?

Is it necessary, then, to admit a new principle in order to explain man? Are not even his loftiest faculties, in their essence, physiological properties that have become more and more specialised, by virtue of the general law of differentiation? Must we not appeal to physiology for the explanation of psychological phenomena? Is it not useless, illegitimate, and dangerous to profess to set up psychology as a distinct science, having no other connections with physiology than those which may exist, for instance, between physiology and physics?

No doubt it seems to be established that every psychological phenomenon, in the present life, has its condition of existence in determinate physiological phenomena; and so it is legitimate to inquire into the physiological conditions of psychic life, as well as into the psychic conditions of organic life or the mechanical conditions of physical transformations. But can this inquiry, however advanced we suppose it to be, end in psychology being absorbed into physiology?

In all psychological phenomena we find, in different degrees, an element which the theories of reflex action or even of transformed sensation take for granted without explaining it: self-consciousness, reflection on one's own modes of being, personality. Every

psychological phenomenon is, or may be, a state of consciousness.

Sensation already contains this element ; consequently, to build up the faculties of the soul by means of sensation, is to take for granted what is here in question.

Is reflex action capable of producing consciousness by analytical development ? By decomposing consciousness into its elements, can we show that they are all contained in reflex action and that this latter also contains the law of their combination ?

Shall we say that the act of consciousness is the perception of difference ? Perception, however, presupposes a thinking subject.

Shall we affirm that consciousness differs from physical phenomena only by the absence of simultaneity in states ; that the successive order, moreover, common to psychological and physiological phenomena alike, includes both in the same genus ? But why should succession pure and simple imply consciousness of oneself, whereas succession combined with simultaneity would exclude it ?

Is consciousness an accumulation of vital force due to excitations from without and to the centralisation of the organic system ? But how could vital force, by being accumulated, acquire a property which it does not manifest in the slightest degree when in a state of dispersion ?

Is consciousness no more than the conflict of external forces with the tendencies of the organism ? But why does this conflict produce consciousness, whereas the clash of one body against another does not produce it ?

In a word, we cannot escape from this alternative: either consciousness is artificially introduced into the organic fact from which we have to extract it; or else, taking consciousness first of all as it is, we find ourselves incapable of reducing it, by a wholly analytical process, to a purely organic fact.

In reality, what we are here analysing under the name of consciousness is not consciousness itself, but either its conditions or its object. Its conditions form a complex *ensemble*, reducible, it may be, either wholly or partially, to physiological and physical elements. Similarly, its object (sensations, thoughts, desires), considered in itself, forms a complex *ensemble* which may offer a more or less exact parallelism to the succession of physiological facts. Consciousness itself, however, is an irreducible datum which explanation obscures and analysis destroys. To try to find the detailed elements of consciousness for the purpose of contrasting or connecting them with the elements of the lower functions, is to lose sight of consciousness itself and to consider its materials or its product. Consciousness is not a phenomenon, a property, or even a function: it is an act, a transformation of external data into internal data, a kind of living mould in which phenomena undergo a process of successive metamorphoses and the whole world may find exercise for activity, by losing its own distinctive substance and form, and assuming an ideal form, one both unlike and analogous to its real nature. Consciousness is the principle of so profound an

elaboration of phenomena, that no acquaintance with previous transformations could ever give an idea of it. In one sense, it adds nothing to being, since things would none the less be, even if they were not perceived in consciousness. In another sense, it is consciousness that makes being ; for the conscious person, an exalted form of being, attributes reality only to what enters, or is capable of entering, into its consciousness. On the one hand, reflex action loses nothing of its essence through not being the object of an inner apperception ; and the most complex combinations of different reflex actions may be conceived, without introducing consciousness as an integral element. In dealing with reflex actions, we are dealing with things known, not with persons who know. On the other hand, consciousness, when it appears, throws no light on reflex actions themselves ; for it does not reveal what is taking place within our organism, in the strict sense of the word. It gives rise to phenomena wholly heterogeneous, and which, though in some way linked with physiological phenomena, and reproducing in their own fashion and more or less exactly the order in which they exist, none the less form within themselves a world apart, and — what could not be foreseen by considering only the complexity of reflex actions—a world shut out from other consciousnesses.

Moreover, it matters little that we are able to find, in sensation, thought, and desire, elements which enable them to be compared with physiological phenomena. That to which there is no analogy in physiology, is the

consciousness of sensation, thought, and desire. Similarly, the existence of degrees of consciousness is here a matter of indifference. The connection between phenomena and a self is all that must be understood by real consciousness. It is this connection that gives to sensation, thought, and desire, a new and special form.

To attempt, therefore, to understand consciousness by the method of analytical construction and combining reflex actions in accordance with their own distinctive laws, is to go against its very essence. Along these lines, nothing would seem to be more complex than consciousness. On the other hand, nothing would appear simpler and nowhere else does nature approximate so closely to that ideal term : unity in perfection. Consciousness is not a specialisation, a development, or even a perfecting of the physiological functions. Nor is it, either, a phase or a resultant of these functions. It is a new element, a new creation. Man, endowed with consciousness as he is, is more than a living being. In so far as he is a person, in so far at least as his natural development culminates in personality, he is endowed with a degree of perfection to which those beings that are only individual organisms cannot rise. The form in which consciousness is superimposed on life is an absolute synthesis, an addition of radically heterogeneous elements: the relation it implies is therefore contingent, from the logical point of view, at all events.

Can we now affirm that this relation is an act of reason itself, which, starting from the concept of life and

enriching it in accordance with a transcendental law, forms its consciousness, as a necessary effect ?

This recourse to reason would be justified, were we dealing with a consciousness absolutely *one*, both in its subject and in its object, consequently irreducible to the data of experience. The consciousness, however, with which psychology deals is individual and recognises plurality of subjects ; again, in each individual, it branches out, as it were, according to the multiplicity of the things to which it applies, and everywhere permeates the varied field of experience. Now, the existence of consciousness, as thus understood, cannot be revealed by the understanding *a priori*, which does not recognise the distinction between individuals and the endless variety of phenomena : on the contrary, it is the immediate object of the empirical consciousness itself ; in other terms, it still belongs to experience. We cannot then argue from the way in which we become acquainted with the nature of consciousness, and go on to consider its realisation as necessary in theory.

Finally, relying on experience itself, can we maintain that the connection of consciousness with life is necessary in fact ?

To prove this proposition, it is not sufficient to show that consciousness constantly shows forth when certain conditions, which we are more or less able to define, are realised in the organism. For we have to find out whether or not these conditions have been created by consciousness itself : an admissible hypothesis, if the

laws of life are contingent. Uniformity of co-existence, even if it manifests a causal relation, does not indicate which of the two terms is the cause of the other.

We should therefore have to be in a condition to explain, by the laws of general physiology alone, all those nervous phenomena which seem to be the conditions of consciousness; now, this would seem to be a rash attempt. A profound study of innervation appears to regard this function as more and more unique. Nervous excitation and discharge, the property, inherent in the nerve cells, of retaining for a certain time the impression of the external agents; the transmission of that phosphorescence, as it were, to cell-groups non-impressed by the object itself and which begin to vibrate harmoniously, in their turn spreading the excitation: all these facts are generally regarded as disproportionate to such elementary vital properties as nutrition, development, and generation, and even the power of contraction, which, however, already supersedes the general properties. Between innervation and the elementary physiological properties there seems to be a connection analogous to that existing between the mechanical conditions of physical and chemical phenomena and purely mathematical forms. An attentive examination reveals the existence of a quasi-insurmountable chasm between the most complex analytical syntheses of a given form existing only for itself, and the particular cases in contact with which we find ourselves when observing phenomena which, whilst being modes of this form, play the rôle of conditions as

regards a higher form. The observer, dwelling on the actual generic identity of both sets of phenomena, instinctively takes for granted that they have one and the same origin ; and yet all explanation of the matter distinctive of a superior form, attempted along the lines of this hypothesis, is found to be superficial, inadequate, and anything but searching. Error is inevitable if some higher intervention diverts things from the course proper to them, and that, not suddenly, but imperceptibly, not from one end of evolution to the other, but only at the origin.

Still, there would be grounds to believe that this divergence of nervous functions as regards general physiological properties is but apparent, if beings possessed of a nervous system differed only in degree from those deprived of one. The presence of such a system coincides with the appearance of consciousness, a faculty superior to all the vital functions. Hence, may we not reflect that the reason why consciousness always appears when certain physiological conditions are given, is that consciousness itself projects these conditions, without which it could not manifest itself ? The reason why the dawn is the harbinger of the sun is that itself emanates therefrom.

It may, however, be that certain physiological conditions are not specially set apart to make consciousness possible. 'Perhaps, a beginning of consciousness is actually connected with the essential vital properties, so that there is but a difference in degree between lower and

higher organisms. Thus there would seem to be some consciousness even in the cell; and, in order to create a human consciousness, we should only have to specialise, diversify, organise the consciousnesses peculiar to cells.

Even though a rudimentary consciousness belonged to each cell, consciousness, or the sense of its own existence, would still be irreducible to the truly physiological properties, and would not have its origin in them. In the cell, as in the higher organisms, the presence of consciousness appears to be contingent. Are we justified, however, in believing that such a faculty exists in the lower organisms?

In support of this theory, there may be advanced a great number of facts, obtained by observation of the infusoria and plant life. The fresh-water polypus, for instance, attracts to itself the living infusoria and the plants by producing a sort of eddy with its arms; it pays no attention to dead or inorganic beings. We find that plants choose supports for themselves; they are seen to quiver at the touch of insects and to catch them. Innumerable facts of this kind appear to prove that, in the most elementary organisms, external action may produce internal excitation, and that this excitation may generate a reflex motion adapted to the needs of the living being. Now, are not excitation and the choice of a suitable course of action, signs of consciousness?

It is doubtful whether excitation and reflex motion are invariably found along with consciousness, for there take place within us many excitations and reflex actions which

do not affect the self. The suitability of the act constitutes what is called finality. Now, does finality—admitting, in the facts alleged, that it cannot be reduced to mechanism—necessarily presuppose consciousness in the being in which it is manifested? Are we conscious of the act by which the physical, chemical, and physiological constitution of our organs applies to the functions they have to carry out?

But, it will be said, the kind of consciousness which seems absent from the physiological functions consists of a clear distinction between subject and object. Now, this is too restricted a way of interpreting consciousness. Consciousness admits of infinite degrees, from the perfect state which characterises reflex life right on to its apparent abolition, which takes place in sleep. As a general rule, on waking, our mind is not empty; it is frequently busy with ideas more or less different from those with which it was occupied before falling asleep. Attention and accumulation render distinct perceptions which at first are insensible. That which, when multiplied, becomes manifest, was not zero. It is actually a dim consciousness of this kind that is found in the lower beings.

This deduction implies a striking change of the concept of consciousness.

So long as we are dealing with man, consciousness, even if reduced to its minimum of intensity, is invariably the act by which a multiplicity and a diversity of states can be traced back to a self, and to one only;

the appropriation of phenomena to a permanent subject. Clearness of perception, not unity of self, is what varies.

When dealing with inferior beings, however, with their irritability and the finality of their acts, consciousness neither is nor can any longer be the attribution of different sensations to a single self; for comparison between sensations is the condition of unity of consciousness, and this comparison, in its turn, presupposes a centre in which culminate the impressions caused by different objects. The consciousness we attribute to the lower beings can be nothing else than sensation, thought, and tendency pure and simple, considered as susceptible of existing without being perceived by a self.

Now, when thus reduced to its real value, the consciousness we attribute to the lower beings presents more than one difference in degree from human consciousness. It is no longer a self, comparing and concentrating within itself a multiplicity and a diversity: it is an aggregate of conscious sensations, without anything to bind them together. Whereas human consciousness admits of only one sensation at a time, these aggregates admit of sensations both successive and simultaneous. As regards the cell, or the simple anatomical element, the kind of unity that its consciousness is capable of possessing is radically distinct from real unity of consciousness; for, by virtue of its organic simplicity, the cell can have none but sensations of one and the same quality. The only differences capable of taking place in this consciousness are differences of quantity, of intensity. Now, unity of

consciousness is that very attribute of the subject which compares different qualities with one another. Only in this comparison is the subject conscious of self and contrasted with external things.

After this, how are we to conceive of human consciousness as having its origin in the consciousness attributed to the cell?

Are we to say that personal consciousness is but a final resultant of elementary consciousnesses; that these latter consist of sensations, thoughts, and desires, and that, once their combination has produced a resultant or a personal consciousness, the new sensations are within or without the self, *i.e.* become perceptions or remain sensations, according as they are or are not brought into relation with this resultant?

As elementary consciousnesses, however, do not even possess the germ of unity which characterises personal consciousness, one does not see how the latter could result from the combination of the former. Besides, one does not understand how several consciousnesses could thus become blended in ever higher consciousnesses. It would seem as though it were part of the definition of consciousness that it is excluded from other consciousnesses. If the objection is made that this property belongs exclusively to the consciousness of a self, but not to consciousnesses devoid of unity, the concept of these elementary consciousnesses is made indiscernible, and their heterogeneity, as regards the personal consciousness, becomes even more radical.

Shall we say that the personal consciousness is an aggregate of elementary consciousnesses?

In that case, we abandon all explanation of their unity. Besides, if the elements of the total consciousness belong to each cell in its own right, as this totality of lower consciousnesses is wholly renewed after a certain number of years, one cannot understand why the consciousness which is supposed to summarise them continues to exist.

In short, will it be alleged that it is the consciousness inherent in a single cell that is raised to a high degree of development through its relations with the other cells?

This explanation might suffice were we dealing only with a difference of intensity, whereas we are dealing with a difference of nature and also with the permanence of consciousness throughout the vital vortex. Now, in spite of their rôle as general recipient, the cells of the brain, compared with the other cells, offer only a difference of degree, inadequate to account for the generic difference which, according to this hypothesis, would exist between their properties and those of the other cells. In presence of almost similar anatomical elements engaged in functions so disproportionate, we can regard matter as only an instrument, controlled by irregular powers.

In a word, the consciousness attributed to the cells only nominally resembles the personal consciousness. Radically devoid of subjective unity, it cannot, however complicated it be regarded, account for perception of

qualitative differences, which is the attribute of the self. Hence, it is advisable to avoid using a word which may cause confusion, and to say that we are simply dealing with sensations, thoughts, and unconscious tendencies. How far such phenomena are conceivable ; what remains of sensation, thought, and desire, exclusive of that self which, in man, appears to form their substance ; how these unconscious modes of being are distinct from simple excitation, reflex motion, and adaptation : are all points of only secondary importance when the self is no longer concerned and we are dealing only with properties radically inferior to strictly psychological phenomena.

It is thus proved that the personal consciousness is not inherent in all living beings, but exists only where we find a special physiological organisation. If this organisation has come about in accordance with the physiological laws alone, without the intervention of any higher principle, it certainly does not follow that consciousness is an effect thereof, since it contains something more than life ; but, in that case, the appearance of consciousness is necessary just in so far as it is connected with the physiological phenomena accompanying it. If, on the other hand, we may admit that the vital properties which are the conditions of consciousness cannot wholly be explained by the general laws of life, it is likely that consciousness itself intervenes in the realisation of these properties, and that, along these lines, it is realised contingently, although connected, in the actual world, with determinate physical conditions.

Thus we see that the creation of man, a conscious being, cannot be explained simply by the operation of the physical and physiological laws. His existence and actions impose on nature modifications which she herself cannot understand, and which appear as contingent, if we adopt the standpoint of the physical and the physiological worlds.

Still, what does the varying disposition of things matter to man, if he recognises fatality within himself; if his feelings, his ideas, his resolves, his inmost life, in a word, are governed by a special law, which determines them necessarily? Can the independence of the thinking world in its relation to the lower worlds affect the individual, if all his acts are fatally implied in the system of physiological facts; if, as regards this system, he is but a drop of water borne along by an irresistible torrent?

Now, has not every being its own law, and should not the phenomena of consciousness, like other orders of phenomena, exhibit relations of mutual dependence?

Unquestionably one is at first inclined to consider the soul as a wholly spontaneous power; each of its acts seems to find in itself alone, and not in the concomitant phenomena, both its purpose and its cause. Do not psychological phenomena defy calculation? Is it possible to predict what such or such a person will do in such or such circumstances?

Soon, however, a more attentive study reveals uniform psychological successions; at least, so far as feelings and thoughts are concerned.

The will long remains refractory to science; over against the doctrine of contingency it sets up a barrier which seems impregnable. The march of observation and comparison, however, reveals the existence of political and social laws of nature. History shows us various societies coming into being, developing and decaying alike. From the many literatures and institutions, it extracts a general form of human activity which appears constant. The exact sciences in turn demand a share in the study of social and moral phenomena; in this connection they determine an average type which remains perceptibly immutable. Statistics submits to calculation, and that successfully, the products of the human will, as well as the products of physical forces, when dealing with large masses.

Here one would like to set up a distinction between the whole and the individuals, and declare the spontaneity of the latter, alleging that in abstract mathematics we find fixed laws—those of the *large numbers*, as they are called—for totalities of cases, each of which, taken separately, is supposed to be fortuitous, and concluding therefrom that the determination of the totality does not prejudice that of the details. Chance, however, of which the mathematician speaks is but a fiction. In reality, everything has its reason for existence. Why human actions, taken one by one, seem to happen by chance, is because there is an infinite number of particular causes which oppose the general causes whose influence is being studied, and, as these particular causes are wholly

lacking in convergence, there is no law governing their combined action. It is this very cancelling or mutual annulling of certain causes that sets free and manifests certain others. Moreover, the direct observation of particular groups and individuals increasingly limits the amount or the degree which statistics seems to leave to chance. It is likely that a constant mean might be found for the acts of an individual as well as for those of a society. The better a man is known, the more certainly, as a general rule, can his conduct be explained and foreseen. If there is any uncertainty, we might say that this is because data are lacking. Are we to admit that the state of the weather happens contingently, because we cannot foresee it with any degree of certainty?

What is the general formula of the psychological laws?

The most scientific process of determining this formula is, at first sight, that of reverting to the physical and mechanical conditions of the states of consciousness. May it not be said, for instance, that experience manifests a constant relation between the physical modifications of the body and the modifications of the soul: that both orders of phenomena exist, increase and decrease at the same time and in the same proportions? Applying to the soul the general law of the correlation of forces, may it not be conjectured that there is a mechanical equivalent of sensation, thought and will, as well as of heat or chemical action? Thus, physical necessity would seem to be the basis of psychological necessity.

The analogy which may exist between psychological

development and physical development would not justify the hypothesis of a transformation of mechanical into psychological phenomena, since motion is not even transformed into heat, strictly so called, but simply constitutes the condition, the material basis of this latter. This analogy, however, seems to indicate that the thinking world is but a sort of inner lining of one part of the mechanical world. It leads one to suppose that, in reality, there is an exact parallelism between thought and the concomitant movements. It inclines to the belief that there might be found formulæ enabling us to explain and foresee psychological phenomena simply by considering their mechanical conditions.

This would be quite legitimate, could we compute in themselves the psychical variations corresponding to the mechanical ones.

Now, fully to compute the manifestations of the soul, it would be necessary to convert the diversity of psychological phenomena into homogeneous quantities, *i.e.* for instance, into quantities of psychic energy. Is it possible, however, thus to reduce to one and the same unity of computation the various qualities of the soul ?

Before entering upon this problem, we should manifestly have to begin by studying the mechanical variations that correspond to the variations of one and the same psychic quality. Suppose we study recollection or memory from this point of view. We should have to draw up the following table, S being a quantity of memory and Q a quantity of motion ; S_1, S_2 being

particular given values of S, and Q_1, Q_2 the corresponding values of Q:

S_1	Q_1
S_2	Q_2
.	.
.	.
.	.

The deduction would be that $S=f(Q)$.

But how are we to procure S_1, S_2, etc.? Memory is not a simple quality, any more than is the soul itself. It includes clearness, keenness, complexity, exactness, precision, remoteness in the past, the sense of personal identity, the consciousness of having already conceived the idea in question, etc. The very thing that determines the value of memory is the presence, absence, and degrees of these various qualities. We should first have to forgo measuring so complex a whole as memory, the values of which, by reason of this very complexity, are not quantities of the same nature. It would be necessary to look for simple and exactly defined qualities, analogous to extension and motion; to determine the mechanical equivalent of each of these qualities, and then find a numerical relation between these qualities considered separately, and the results of their combinations. Now, to do this scientifically would be impossible without appealing to tact, judgment, feeling, in other words, that direct appreciation of quality which is the very thing we have to supply. Besides, there is nothing to prove that psychic qualities can be decomposed into simple elements, identical through all their changes of intensity.

A fortiori, these remarks apply to the moral qualities of the soul, the most important of all.

If now, inversely, we deduced from the variations of the physical phenomena the corresponding variations of the psychological phenomena, we should be caught in a vicious circle. Were we to measure the latter by the former, in order to set up a constant relation between these two series of variations, it must previously have been possible to measure them separately.

This method of investigation, then, seems as though it could have no result, even approximate, unless it be applied to a very restricted aspect of the psychological world, to that aspect through which the soul comes in contact, as it were, with matter, and is not yet itself. Considered in its distinctive essence, the psychological world cannot be regarded as a duplication of or substitute for the physical world, for then we should be unable to explain the great disproportion, from the moral point of view, between actions which have expended almost the same amount of physical energy and consumed almost the same weight of carbon. Do we know the cost of intellectual work if we are aware that its mechanical equivalent is a little greater than that of average muscular work of the same duration? Is one to judge of the value of a pleasure, the truth of a thought, the merit of an act, from the weight that could have been raised by means of the carbon oxidised on the occasion of this pleasure, this thought, or this act?

In vain, then, do we invoke the parallelism of psycho-

logical and physical phenomena for converting the soul into a function of motion. Psychological phenomena cannot be measured as motion can, and, in so far as degrees can be set up between them, these variations, in the higher regions of the soul, hold no assignable relation to variations in amount of physical force.

This may also be affirmed, though less absolutely, of the doctrine which regards psychological phenomena as only the inner reproduction, not of mechanical, but of nervous, phenomena. Here, too, the parallelism is only partial, although it certainly extends over a greater portion of psychological life. Indeed, it matters little that modifications of the nervous system correspond to each modification of the soul ; the main thing is to find out if the one set of modifications is the measure of the rest. Now, there is no proportion between the physiological difference and the psychological difference which distinguish, let us say, insanity from genius ; and when we judge the soul by the body, we are inclined to identify these two states. Again, whereas, in comparing psychological phenomena with mechanical phenomena, one of the two terms, at all events,—the mechanical phenomena —was exactly measurable ; here, neither of the terms is scarcely more measurable than the other, so that there must inevitably be great uncertainty as to the degree of correspondence.

In short, the only really practicable thing to do is to seek, not correspondence between relations, but correspondence between phenomena considered separately.

Then we can obtain definite and instructive results; but these do not reveal the law of psychological phenomena, because, since the law of physical determination is not absolute, they leave unsolved the question whether the physical conditions are not partially determined by the soul itself, and what, according to this view, is the degree of psychic influence on the production of these conditions.

Still, while it is impossible to deduce the necessity of the psychological phenomena from their correspondence with the lower phenomena, do we not find in the psychological world considered *per se* the proof that its foundations are immutable and its evolution necessary?

The possible and fruitful application of statistics to the study of the psychological phenomena, the discovery of constant moral averages, seem to indicate that these phenomena are subject to a fundamental law analogous to the laws of the lower worlds, and that this law consists of the permanence of the same amount of psychic energy.

Again, the law of the conservation of force, in mechanics, is only practically true for a sufficiently large totality of movements, such as the solar system. In physics and chemistry, the application of the law of conservation is particularised; each form of matter tends strongly to retain its properties. In living beings, the conservation of form is even more particular; it applies to the specific essence. The typical organism, constantly impaired by extraneous forces, makes use of these very forces to repair the breaches made upon it. In the

thinking being, energy is personified. In each of us it is aware of its permanence and feels an irresistible inclination to claim for itself eternal duration.

No doubt the soul has its own growth and vicissitudes. But if we admit the existence of latent psychic forces, if we note the gradual weakening of certain faculties whilst others are growing, if we observe that each man, speaking generally, possesses a maximum of psychic progress, and that after reaching it, the average man instead of remaining there enters upon a phase of decadence as though to restore the equilibrium ; if, in short, we understand the external influences, the relations of men to one another, which modify the evolution of the distinctively human nature ; then in all probability we shall conclude that psychic energy, even throughout the whole of an individual life, tends in the direction of a determinate average ; that law is on the side of determination and permanence, and that facts to the contrary are but exceptions.

Even in a given phase of the psychological life of an individual, the amount of mental energy seems to be determined. If one of the faculties of the soul is highly developed, as a general rule, it is to the detriment of the rest. If a feeling, an idea, a resolve acquire considerable force, the weakening of the other modes of activity restores the balance. Thus, present feelings end in effacing past feelings, more or less completely. Thus, also, sensible impressions, driven back by new impressions which absorb the best part of the mind's energy, become

thereby less keen and pass from the state of sensations to that of images ; then, before the ever-rising flood of new sensations and images, the former fade away in the distance, gradually lose their colour, their distinguishing characteristics and their life, to become vague, abstract, and dead ideas : a useful metamorphosis, whereby the most diverse ideas of things gradually combine and mingle with ideas of a more and more general nature which bring before our mind the framework of the phenomena. Thus, in short, within the sphere of the will, energetic resolves are frequently followed by dejection, despair accompanies heroism, and constancy in effort is the most difficult virtue to attain.

For all that, the soul has the power to restore to its dead feelings, its effaced ideas and its languishing resolves, their pristine energy ; at times, even, an energy they have never had before. But in this case also, there is no creation of psychic energy. This resurrection does not come about of itself. It is determined by a present state analogous to the past, and it is the life of the present that is communicated to the phantom of the past.

This law of conservation seems presupposed in every inquiry that tends to explain the states of consciousness, considered by themselves, in the way in which the physical phenomena are explained ; it is implied in every attempt of positive psychology.

And now, if the amount of psychic energy remains the same in the thinking being, can human actions be regarded as contingent ?

It is no more plausible in psychology than in mechanics to allege, for guaranteeing the contingency of phenomena, the distinction between indeterminate force and direction, or to admit that the permanence of the one does not bring about the determination of the other. Mental actions, sensations, ideas, tendencies, are never given in an indeterminate state. The direction of the antecedents, as well as their energy, must be included in the consequents, and, to obtain in the consequents a different direction from that resulting from the combination of the antecedents, there must be introduced a new direction ; this necessarily implies a new energy of a certain intensity. Thus, a change of direction, or, in dealing with the soul, a change of quality, always presupposes a change of quantity. This new quantity may have been borrowed by the given being from other beings of the same order ; but the change that has come about in these beings must also itself have had a determining reason ; and if, in the totality, the quantity of action remains constant, the phenomena can be no more than a *circulus*, in which contingency will have no place. The soul, considered in general, no more explains the particular character of any particular feeling, conception, or intention, than force, considered in general, explains the direction of motion.

It would seem, then, as though we must abandon all contingency in the order of mental phenomena, if we admit absolutely the law of the conservation of psychic energy, the proportionality of sensations, ideas, resolves,

with their psychological antecedents. But is this law necessary?

It cannot be regarded as given analytically *a priori*, since the idea of psychological operations does not imply a determinate degree of energy as the condition of their existence.

Nor is it a synthetic judgment *a priori*, since, on the other hand, man is inclined to regard himself as master of his own actions. This law is an experimental cognition; it cannot claim to be more than a necessity of fact.

Now, is this very necessity inherent in the law?

If we pierce the first covering of things, we certainly find that the endless variety offered by the surface of the psychological world does not exist in reality. Even in the moral order of life, beneath changing externals, there are strata ever more and more solid. Beneath the disposition of the moment is individual character; beneath individual character are the manners and customs of the time; then follows national character, and, finally, human nature itself. Now, human nature remains perceptibly unchanged.

This is the result generally reached by the psychologist. The historian, however, is disposed to see things in another aspect. For him, everything is in a condition of change; there are no two epochs exactly alike. The assimilations set up between past and present are never more than approximate. And it would really seem as if the precise and short definitions, stated as ultimate whereby the philosopher loves to crown historical generali-

sations, inevitably leave out a portion of reality: as though that which lives were, in essence, incompatible with the exactness, unity, and immutability of a formula. Is there a man anywhere whose character is really invariable or constant? Is there a nation whose entire history is the expression of one and the same idea? Does human nature itself involve an immutable basis? Are we to neglect changes which may take place, even in the principles of things, under the plea that, in themselves, they are at first very slight and imperceptible? In drawing an angle, no modification in the divergence between the two lines is a matter of indifference.

Are we now to pursue analysis and abstraction until we come to a truly identical principle? In that case, what will remain of the soul at the end of the process? Of what does human nature consist when reduced to such features as are absolutely common to all men? Manifestly, when undergoing this successive elimination of all particular elements, it will gradually lose everything that constitutes its greatness. In short, generalisation, the curtailment of specific characteristics, culminates in ever poorer and emptier concepts, which are also less and less calculated to explain real life. It is wrong to regard beings as having their substance in an immutable element, and impossible fully to explain change by the nature of things, this nature being considered as the immediate and equally immutable expression of substance as thus understood. Where do we find, especially in man, a primordial nature which does not presuppose

action? Is not character the result of instinctive or reflex actions? Would the faculties of man develop, would they even exist, if they were not exercised? What is the soul prior to action? Has primordial matter, especially in this case, if such matter exists, a rôle that can be compared with that of the artist who moulds and organises it, gives it life, form and beauty? In spite of appearances, no individual, nation, or even man is ever wholly the slave of his character, for this latter is born of action, and consequently depends thereon. The predominant mark of human nature is not immobility: it is change, progress, or decline; and history, from this point of view, is the necessary corrective of static psychology. Passing from one state to another is always the real condition of man; the most general psychological laws refer to some phase of humanity.

This doctrine, moreover, does not contradict the data of psychology, when the latter is not already compelled to reduce everything to exact, immutable formulæ. A psychological consequent never finds in the antecedent its complete cause and all-sufficing reason.

This disproportion in the two terms is particularly evident in voluntary actions. In the resolve that follows a consideration of motives, there is something more than in the motives themselves: the consent of the will to some particular motive in preference to some other. The motive, therefore, is not the complete cause of the action. Still, is it the all-sufficing reason thereof? Undoubtedly it is always the strongest motive that pre-

vails, but only just so far as we subsequently give this title to the very motive chosen by the will. It would have to be proved that the will invariably chooses the motive which, of itself, exercised beforehand the strongest influence on the soul. Now, does it not happen that the will practically renders predominant a motive which, theoretically, was not the resultant of the forces that appealed to the soul? When, from without, we observe the conduct of our fellow-beings and even our own conduct, we find that the same actions are uniformly connected with the same motives. But does it follow that the actions are determined by the motives considered in themselves, and will not this law be equally well exemplified, if it is the will itself that brings forward and emphasises the conditions of its action?

If this is so, it will be said, the act is doubtless explained; but the relation between the predominant motive and the totality of the determinations of the soul contradicts the principle of causality. True, and it might be that a free act would indeed be inadmissible were the principle of causality to be admitted as absolute. But it might also be that this principle, in its application to facts, is not so rigid as abstract science alleges, and admits of some contingency in the transformation from an antecedent into a consequent. What deceives one is that the proximate causes of the given act are linked—or appear to be linked—together in a way that exactly conforms with the principle of causality. But how could one prove that, by ascending the series of causes, one

would not reach a point at which this principle would no longer suffice to explain the phenomena, so far at least as these could be completely analysed? Possibly the controlling power does not intervene at all places and times with the same energy, and, after supplying the impulse, leaves things more or less to their natural course, when that suffices for the completion of the action. This impulse, in itself, may be extremely feeble; but when applied at the right moment and the appropriate point, it may determine great phenomena by its consequences.

Assuredly also, in a general way, the superior agents do not dispose of the inferior forces at their pleasure. It is more especially when the latter are struggling with one another, and are as it were balanced, that the superior agent intervenes easily and effectively. When the soul is torn between various desires, the will makes a way for itself without any effort, deliberates and pronounces judgment. On the other hand, when the will finds itself in the presence of passions which, converging towards one and the same end, become mutually strengthened, what happens is that it forgets itself and surrenders. But even then it may awake and act; it may struggle against the stronger passions, either indirectly by bringing over against them other passions of like intensity, or by diverting them imperceptibly towards other objects, or even directly by rising alone against its adversaries. Even in the most unfavourable circumstances, the will may make use of the very laws that govern the soul in order to direct it.

While the production of the voluntary determinations is that order of psychological phenomena in which contingency is best manifested, the other orders are not entirely devoid thereof; for feelings or ideas, however simple or general the relation we are considering, never find a complete explanation in their psychological antecedents. They always appear as being something other than these antecedents, as containing new qualities; and so they do not come under the law of proportionality between cause and effect.

Thus we find variability even in the deepest depths of human nature. Hence, is it likely that the amount of psychic energy is exactly determined, remains exactly the same? To have the right to affirm such a law, we should have to be able to reduce all psychological successions to an exactly determined mode of elementary succession, the permanence of which would be demonstrated. Now, it is just this term that eludes the investigator.

But perhaps the radical change itself finds its necessary law in an immutable dynamic principle antecedent to all phenomena; perhaps the psychological world is a uniform evolution in which the very essence of the soul is implicated.

May we not say, for instance, that the line of advance of the psychological phenomena must necessarily be the resultant of two elements: on the one hand, an *ensemble* of the faculties that constitute the nature of a given person; and, on the other, one or more tendencies, such

as the search after happiness, the life instinct, the adaptation of internal faculties to external conditions ?

There are several objections to this doctrine. We may ask if it is possible to bring all human actions under these formulæ or even under any kind of formula, since man feels himself capable of deeds of heroism and self-sacrifice, of actions that overpower the strongest opposition in his nature.

Admitting its possibility, at all events it is difficult to determine exactly the formula we intend to adopt ; for the formulæ in question, each of them correct to a certain extent, cannot be reconciled with one another.

The desire of happiness, for instance, may make us detest and flee from a life which happens to be one of continual suffering.

The love of physical and moral life, by inducing us to develop our strength and faculties as far as possible, occasions innumerable difficulties and conflicts with the outside world, numberless sufferings which do not exist for inactive natures.

The more tendencies become adapted to things, the feebler becomes consciousness, which needs a shock in order to manifest itself, and replaces keen, pleasant or unpleasant sensations by a state of indifference or apathy. More than this, the conflict between man and the physical world is owing to the fact that man pursues ends which things do not spontaneously realise, ends superior to those of things. To stop this conflict, there must be a cessation of the pursuit of these superior ends. Man,

who makes adaptation to external conditions the object of his life, will thus have to descend once more the ladder of being, one step after the other, to submit to and identify himself with the things whose impact he dreads. Hence, he will no longer see anything but evil in conscience, intellect, feeling, life, even in existence, for all these tendencies are opposed by the external world; finally, he will regard absolute annihilation as the one supreme boon.

Moreover, even though it were demonstrated that all man's actions can be explained by these dynamic formulæ or by others of the same kind, it would not therefore follow that necessity controls psychological life; for these formulæ do not fulfil the conditions of a positive law or relation between experimental data.

First, there is something vague and indeterminate about the second term of the dynamic law: the end offered to human activity. What is happiness? Do all men form the same idea of it? What is the kind of happiness that is regarded as the universal end of human actions? Similarly, of what does the harmonious development of our powers and faculties consist? In what way must they be subordinated to one another? Will it be admitted—to remain as far as possible within the realm of facts—that the highest faculty is that which supplies the greatest force? Even then, it is by no means evident that moral greatness comes under the category of force, and that it does not deserve to be sought for its own sake. Is the proportionate develop-

ment of our innate powers a clear principle, calculated to be understood in the same way by all men? And may not the adaptation of tendencies to things also be conceived in several ways? Are we to set in the same category the man who seeks to conform to external conditions without any sacrifice of his human prerogatives and the man who allows his higher faculties to decline under the plea that they check adaptation? What is the kind of adaptation that we are to look upon as the natural end of human actions?

Second, can one say that a tendency is a positive reality? Does the tendency exist only when it is manifested; is it no more than a sum total of past or present actions? Assuredly it may exist, even though it should not be manifested. Is it a sum total of possible actions? One of two things must be true: either these actions will certainly be realised, and then they are not simply possible, they are future: but it is not necessary that a tendency should be realised for the possibility of its existence to be admitted; or these actions are truly possible, *i.e.* will either be realised or not: but in this case they cannot be regarded as a positive reality, *i.e.* as given in experience.

Similarly, the precise direction, the intensity and intelligence shown by the tendency cannot be regarded as given. For the tendency is the being itself; and who can affirm that the being has not the power to act upon its tendencies and modify them spontaneously? Is this impossibility given, or capable of being given, in experience?

It would appear, then, that it is as impossible to establish scientifically a law of necessary radical change as one of radical conservation. Indeed, change exists in the soul alongside of permanence, even before permanence. On the other hand, a law of change which is not reducible to one of conservation, a law that absolutely precedes things, a principle anterior to concepts, cannot be resolved into the positive laws and so lay claim to necessity.

If this is the case, we have a right to admit that physiological phenomena are not absolutely determined, but that they contain a radical contingency beneath the uniformities of succession which they still offer to the observer.

The character, also, proper to the law of permanence governing man's actions proves that the amount of indetermination in them must be greater than in all other phenomena.

Indeed, in the lower regions, the fundamental laws of permanence are immediately connected with more or less considerable totalities, such as a mechanical system, a form of matter, a living species. Each particular agent is thus, as it were, absorbed into the whole to which it belongs. The law governing it enables it to act only in concert with the totality. Hence, how could a contingent action come about? Will it be by taking its fixed centre from the very law of its action? This law, however, plunging it into the infinite, is wholly antagonistic; its initiative can be displayed only on condition that the whole of the system to which it

belongs is modified. Will this come about by absolutely resisting this hostile destiny which regards it as of no account? But would the being which could act upon things without finding in them its fixed centre still be a creature?

To exist solely as part of the whole would thus be equivalent to subjection to absolute fatality. In truth, nothing real shows forth this character, which is incompatible with existence: it is found only in the purely ideal object of a wholly abstract science. And the reason why beings inferior to man actually show forth, in a collective form, some degree of contingency, is because the systems they constitute are, to some extent, already distinct worlds, outside of which there are both space and fixed centres.

Now, the human person, more than all other beings, has an existence of his own, is his own world. More than other beings he can act, without being compelled to include his actions in a system which transcends him. The general law of the conservation of psychic energy is parcelled out, as it were, into a multitude of distinct laws, each of which is proper to each individual. It is these individual laws that are immediate: the general law is only mediate. More than this: it would appear that, for one and the same individual, the law is again subdivided and resolved into laws of detail proper to each phase of psychological life. The law tends to unite itself with fact. Hence, the conservation of the whole no longer determines the acts of the individual:

it depends on them. The individual, having become in himself alone the whole genus to which the law applies, is master of this law. He turns it into an instrument, and dreams of a state in which, at every moment of his existence, he would thus be the equal of the law, and possess, within himself, all the elements of his own action.

CONCLUSION

When man, in ancient Greece, became conscious of himself and reflected on his condition, he believed himself the sport of an external, impenetrable, and irresistible power, which he called destiny. In accordance with this belief, it was his duty to obey mysterious orders, and he was condemned to expiate inevitable crimes. After bewailing his servitude, he found courage to pronounce judgment upon this inflexible power, finding it cruel and iniquitous, and regarding himself as superior to it. He was astonished that he had submitted to this shameful yoke without examining it. He attempted to escape from and break it: and he did break it. No longer did the world dictate laws to him; he dictated laws to the world. He became aware of his freedom.

Soon, however, there arose within him fresh ground for uneasiness. In order to be free in reality, was it sufficient that he should be free as regards the external world? Did he not feel within himself impetuous stirrings, irresistible forces, analogous to that destiny in which he had formerly believed? Was he then mistaken only as to where this sovereign power had its abode? Though absent from the world, did it dwell within himself? Was

he the slave of his passions, his ideas, and his nature? Was fatality gripping him again, just when he thought he was escaping from it? Undoubtedly, this new fatality was not so brutal and stupid as the former; all the same, was it less absolute? Is a chain any the lighter from not being perceived by the outer world? Under the sway of this outer world, there was one liberty man still retained: that of protesting inwardly against the violence of which he was the victim. Beneath the sway of his own nature, to believe himself free was to be his own dupe. What value does dominion over the outer world possess to a being who is conscious of fatality within himself? In short, destiny was undoubtedly no more than a figure; still, it was a true one.

Greek genius did not stop there. It perceived that the different parts of human nature had not all the same dignity. It succeeded in making the lower faculties yield to the higher ones. It thus saw that this inner fatality governing human actions was not so inflexible as it had at first imagined. Each new effort confirmed it in this idea, this faith in itself; and gradually it found courage to aspire to the perfection of a god who should be master of himself as well as of the universe.

Such, along different lines, seems to be the condition of all beings.

In the universe, there can be distinguished several worlds, forming, as it were, stages superposed on one another. These are—above the world of pure necessity, of quantity without quality, which is identical with non-

entity—the world of causes, the world of notions, the mathematical world, the physical world, the living world, and lastly the thinking world.

Each of these worlds appears, at first, to depend strictly on the lower worlds, as on some external fatality, and to receive from them its existence and laws. Would matter exist without generic identity and causality, bodies without matter, living beings without physical agents, man without life?

Nevertheless, if we examine and compare the concepts of the principal forms of being, we see that it is impossible to connect the higher forms with the lower ones by a link of necessity.

Do we reason *a priori*? We cannot deduce the higher forms from the lower by way of analysis, because the former contain elements that cannot be reduced to those of the latter. The first find in the second only their matter, not their form. The link connecting the two seems to be a radically synthetic one.

And yet, this would be a necessary link, were it laid down by the mind, apart from all experience, in a causal synthetic judgment *a priori*. The formulæ, however, which would seem to presuppose an origin *a priori* are not those that apply to given things, or even to the knowledge of these things; whereas the formulæ that really explain the nature of given things have their origin in experience itself.

Thus, the existence of the various degrees of being is not necessary in theory.

Does reasoning *a posteriori* prove that it is necessary in fact?

Even though science may have assumed the deductive form, it does not follow that its conclusions are objectively necessary. The value of the conclusions is precisely that of the fundamental principles; and, if these latter are contingent, their contingency is necessarily transmitted to all the propositions that syllogism deduces from them. Now, all purely deductive science possesses an abstract and subjective character. Only on these terms are exact definitions possible. Such definitions are artificial syntheses of concepts, impoverished or weakened so as to become wholly intelligible. We cannot, then, apply to things themselves the determination inherent in the definitions of the deductive sciences.

Facts, nevertheless, seem sufficiently to testify to the necessary character of the appearance of each new essence, for this appearance coincides constantly with a certain state of the corresponding matter. But what is the meaning of this coincidence? On which side is the agent, and on which side the patient? Is it the lower principle that determines the appearance of the higher, or is it the higher principle itself which, in being realised, sets up the conditions of its realisation? On the one hand, an absolutely determining phenomenal cause is unintelligible, for it presupposes quantity devoid of all quality, and no such essence can exist: the lower, then, cannot absolutely determine the appearance of the higher. On the other hand, for each progress on the part of

being, we are unable wholly to explain, by the laws of the lower principle, the complication shown by this principle, when it becomes the stepping stone of the higher principle ; it is thus legitimate to admit that it is form itself that fashions matter for its use.

Each given world, then, possesses a certain degree of independence as regards the lower worlds. To a certain extent, it may be an element in their development, may exploit the laws peculiar to them and determine therein forms which were not required by their essence.

But does not each world bear within itself, as an inner fatality, a law which governs its phenomena ; and so is not the contingency of phenomena, after all, pure illusion ?

First, is there not an exact correspondence between a given higher world and the lower worlds, so that the law of the higher world is but the translation, in another language, of the fatality peculiar to the lower worlds : the inner sense, as it were, of a symbolical destiny ?

This correspondence has no such meaning, because it does not exist between the two orders of relations, there frequently being no proportion between the vicissitudes of form and those of matter ; and also because, even were it to exist between the two categories of facts considered separately, there is nothing to prove—unless we consider as absolute the fatality inherent in the lower world, *i.e.* unless we take for granted the very thing in question—that the higher phenomenon has not influenced the realisation of its conditions.

But do not observation and reasoning show that phenomena occur in a constant order ; that uniformities in detail are reducible to general uniformities ; and that, finally, each world is governed by a special law, which consists in the conservation of the very essence of which that particular world is the realisation ?

Unquestionably these laws of permanency exist ; but are they necessary ?

Considered *a priori*, they cannot be deduced from the essence of the things to which they apply, because they relate to extensive quantity, and all essence, being above everything else a quality, admits of an infinity of degrees, from this point of view.

Nor can it be said that these fundamental laws are posited *a priori* by the mind itself. The formulæ which require a rational origin, bearing upon things *per se* or else upon relations that cannot be verified, do not apply to given things or to the knowledge of given things ; and the formulæ which admit of experimental usage contain no term that cannot be explained by experience itself.

It is not exact, then, to say that laws govern phenomena. They are not posited anterior to things, but presuppose them. They express only the relations that are due to their previously realised nature.

But does not science itself, especially when it has assumed deductive form, prove *a posteriori* that the very nature of things does not change ?

On the one hand, we cannot identify with the nature

of things an empirical principle, however general it may be, however fruitful it may appear. Deductive science is radically abstract. It determines the relations of things, once it is granted that their nature remains immobile or fixed.

On the other hand, the world everywhere offers us—along with conservation, which, of itself, practically excludes the idea of contingency — change, progress, or decline, which admits this idea, and that, not only in superficial detail, but even, though probably indefinitely, in the general laws that sum up the laws of detail.

In essence, there is no real relation of antecedent and consequent, however general it may be regarded, which cannot be conceived as necessary, for necessity can only consist in the quantitative relation of antecedent to consequent. Now, quantity can be conceived only as the measure of, and as subordinate to, quality ; this latter, since it is indefinitely perfectible and becomes really different when passing from one degree of perfection to another, however near they may be to each other, and since it finds in the extensive quantity of the barren repetition of one and the same thing no element of improvement, can accept the homogeneity and permanence demanded by the category of quantity only as accidental and relative, not as essential and absolute. Consequently, the law of the conservation of being is contingent.

Besides, it is impossible to find or conceive of a law of qualitative change, anterior to things, that does not imply finality. Now, finality transcends experience.

Thus, such a law does not fulfil the conditions of a positive law ; it can be no index of physical necessity.

The beings of the given world, then, are not in a state of absolute dependence as regards their own nature. It is conceivable that, in their essence, they do not remain eternally similar to themselves, and that the order in which their manifestations succeed one another leaves scope for a greater or less degree of contingency. This indetermination would even enable the higher forms to be grafted on to the lower, by placing the latter in the conditions necessary for the birth of a new germ.

Is it by a series of creations isolated from one another, or by continuous progress, that nature thus rises from the empty barren forms of the ontological and logical worlds to the rich fertile forms of the living and thinking worlds? After all, this is of but little importance, for the higher elements, though spiritualising matter by imperceptible gradations, will none the less remain irreducible to the lower elements and superposed on these latter as an addition, an absolute creation. Do we say that a ship sails of itself, because, from without, we see that it proceeds along a continuous track ?

To discover the intermediate forms which would set up an imperceptible gradation between all the beings of nature, would be to determine how the principle of improvement works ; it would not be the reduction of improvement to immobility, of higher forms to lower ones. To express the idea of improvement by that of development pure and simple is, firstly, illegitimate,

because all development is not improvement; and, secondly, useless, in the present case, because this very development presupposes the intervention of a higher principle which draws out matter from the enveloping state, and compels it to reveal that which it holds hidden. Moreover, the doctrine of pre-existence and preformation seems gradually, in science, to be giving way to that of epigenesis, which, without excluding the principle of development, expressly presupposes a principle of addition and of improvement.

An initial glance at natural phenomena may have given rise to the idea of a universal transmutation, without the addition of higher forms. There may have been a belief that water, by its fluidity, or fire, by its mobility, was the sole principle capable in itself of assuming all the forms with which we are acquainted. There may long have been a persistent belief in the transmutation of metals. Even in a highly scientific age, there may have been admitted the simple transmutation of forces; it may have been thought possible that motion could literally be transformed into heat, life, and thought. Closer investigation has shown that the water or heat which maintain life work themselves into the living body without changing their nature; that base metals remain base in spite of being combined and fused together in all sorts of ways; that motion subsists wholly as motion under the very heat, life, and thought with whose appearance it is associated.

The universe, then, is not made up of elements equal

to one another, susceptible of being transformed into one another, like algebraical quantities. It is made up of forms superposed on one another, although, perhaps, bound together by gradations, *i.e.* additions, that are altogether imperceptible.

And just as each world contains something more than the worlds below it, so within each world the amount of being is not absolutely determined. There is a possible improvement, as also a decline; and the contingency of the degree of perfection takes away that of quantitative measure.

If this is so, the old adage, "Nothing is lost, nothing created," possesses no absolute value. The very existence of a hierarchy of worlds irreducible to one another without being co-eternal is the first derogation from this adage; and the possibility of improvement or of decline within these worlds themselves is the second.

Now, the positive sciences are based on this postulate. They study change, in so far as it is reducible to permanency. They consider things from the standpoint of the conservation of being. What, then, is the value of the positive sciences?

Assuredly, stability is not simply an abstract category, a mould into which the understanding casts things; it reigns throughout the given world. Facts are particular cases of general laws, the world is intelligible; and so it is not ideal possibilities, but reality itself, of which science gives us a systematic picture. Stability, however, has not undivided sway. In the very heart of its empire

there appears, as an original primitive element, the working of a principle of absolute change, of creation, strictly so called; and it is impossible to draw a frontier line between the two domains. We may say that some beings or that one aspect of things are governed by laws, whereas the other beings or the other aspect of things are not subject to necessity. The truth is that in the lower worlds law occupies so wide a field that it may almost be substituted for being; in the higher worlds, on the other hand, being almost causes law to be forgotten. Thus, every fact depends not only on the principle of conservation, but also, and in the first instance, on a principle of creation.

Being, then, at none of its stages, is known in its entirety when the positive sciences have completed their work. Its nature and permanent laws are objects of knowledge; what remains to be known is its creative origin. Of what does this principle, so inaccessible to observation, consist?

It would seem as though the only legitimate way to form an idea of it is to consider its effects. But then, it will be alleged, what are these effects, if not derogation from laws, incoherence and disorder? Subject to necessity, the world might, at least, be comprehended in one single thought: permeated by contingency, it is only intelligible approximately and in fragmentary fashion; it offers nothing but the scattered limbs of a disintegrated organism. What then, in itself, is the principle of contingency, if it is not chance, that word behind which we hide our ignor-

ance, and which, far from explaining things, implies the very abandonment of all attempt at explanation, and, in a way, the abdication of thought?

Perhaps it is not necessary to admit that this principle is known only in its effects. Still, in order to be in a position to apprehend it in itself, it would evidently be necessary to quit the sphere of experience. But if, remaining on the ground of facts, we contemplate the general trend of things without regarding scientific classification as the only type of order, we shall perhaps find that, even in the doctrine of contingency, the world appears as bearing the impress of simplicity, harmony, and greatness.

At the lower stage, even below indeterminate being, is necessity or quantity, pure and simple, the essence of which is unity. This is the emptiest form it is possible to conceive. This form, however, in so far at least as it aspires to separate itself from absolute nonentity, is not altogether immutable. Though affording infinitely small scope to contingency, it does not remain useless. It prepares the realisation of being. Now, being, as given in experience, is fact causing fact, *i.e.* the one determining the other. It is a totality of acts bound to one another by a relation of causality. The essence of being, then, is the relation of the one and the other, multiplicity resulting from differentiation. Multiplicity, in turn, allowing a certain range to contingency, becomes the matter to which the system of genera and species, or the classification of the multiple, is applied as a form.

Now, the general idea, the notion, is multiple, on the one hand, in so far as it can be decomposed into several more particular notions different from one another ; on the other hand, it is one, in so far as it consists of an essence common to these various notions. Notion, then, is harmony introduced hierarchically into the multiple, the combination of unity and multiplicity.

Unity, multiplicity, hierarchy, or unity in multiplicity, such are the lower stages of being, abstract forms, susceptible of being conceived, though not yet of being felt.

Thanks to a certain degree of contingency, to a sort of free play permitted to logical limits, there is introduced a new form of being : matter, a thing extended and movable, the essence of which is continuity. Now, the continuous is nothing else than the blend, the mutual permeation, the unification of the one and the many. Matter, in turn, lends itself to the creation of physical and chemical forms, the essence of which is heterogeneity. Now, the heterogeneous is to the continuous what multiplicity is to unity, being based on the relation of the one to the other. Besides, the physical world makes possible the living world, which has for its essence individualisation, the harmony introduced into the heterogeneous by the predominance of a central element, by hierarchy. The hierarchical distribution of functions, in this second period, corresponds to the third term of the first period, to the combination of unity and multiplicity in the notion.

Continuity, heterogeneity, hierarchical organisation :

these are the concrete sensible forms of being which are superposed on the abstract forms.

Finally, above life itself, and on the foundations it supplies, rises consciousness, where the world is felt, known, and dominated. Sensibility is the condition of the person who is under the influence of things and cannot yet distinguish himself therefrom ; who, as it were, forms one with them. Intelligence is the relation of the person to the things from which he is distinguished, because they appear to him as other than himself. Will is the act of the person who, by virtue of his superiority, co-ordinates, organises, and reduces to unity the multiplicity both of his modes of being and of objects.

Moreover, the conscious form of being is both abstract, in that it does not exist apart in the actual world, and concrete, in that it is given in itself. Still subordinate to conditions and thus dependent on the interior worlds, consciousness yet possesses a large degree of existence of its own. In its material conditions, it finds an instrument even more than a link. It wonders if this instrument will always be indispensable to it, and aspires after a condition in which it would be self-sufficient, possessed of life and action, as well as of independence.

And so each form of being is the preparation of a higher form ; and things thus multiply and become diversified, so that they may culminate in that hierarchical form which gives to the whole its utmost possible power and beauty.

If this progress of being excludes, to some extent, that

order which consists of uniformity, does it therefore follow that it is simply disorder and confusion? Is it not rather that the monotonous order of necessity has partially been sacrificed to a higher order? Is it not an admirable thing that beings should support each other, the lower not only existing on their own account, but also supplying the higher with their conditions of existence and improvement; the latter, in turn, raising the lower to a stage of perfection they could not have reached of themselves? Is it not conformable with order that each being should have an end to realise, and that there should be harmony between the ends of the different beings?

But could this higher order exist if necessity ruled the world, and the formula, "Nothing is lost and nothing created," were applied literally? Does one inquire about the purpose of an action imposed by constraint? Are there differences in value, *i.e.* in quality or in merit; is there progress or improvement in the products of one and the same necessity? Can degrees of value, if an attempt is made to establish them in such a world, be other than conventional differences, relative to the interests or feelings of some being arbitrarily taken as a standard? If contingency, up to a certain point, did not govern the series of determining causes, chance would govern that of final causes, for it is finality itself that implies a certain contingency in the succession of phenomena. To posit uniformity of succession as absolute would be to sacrifice a higher to a lower order:

to subordinate it to finality is to make the true order possible. The most external surface of things and the one farthest from the living centre, marshalled in exact order, to all appearance, because its successions are uniform, really implies that qualitative indetermination which is the genuine indetermination ; but, as we plunge into reality, we find the increase of qualitative determination, value, merit, genuine order, proportionate to the decrease of abstract and inevitable order. After this, can one regard as chance that invisible, ever-present soul which sets the very springs of the world in motion ?

Still, does not the doctrine of contingency, though perhaps offering an æsthetic interest, do injury to the positive sciences ?

It reduces to an abstract value the sciences exclusively based on the principle of the conservation of being, *i.e.* those which are exclusively static. But these sciences, after all, seem to have no other rôle than to deduce consequences from stated conditions, under the hypothesis that these conditions should be exactly determined and the quantity of being should undergo no variation : they do not claim, in themselves, to be exactly conformable to objective reality. No doubt, were every science to come under the static sciences, the doctrine of contingency would reverse the value of the positive sciences. But if it is legitimate to set up dynamic sciences alongside of and above the static sciences ; if objective science actually consists of these higher sciences, then the doctrine of contingency is conformable to the conditions of science.

The only thing is that this doctrine imposes observation and experiment as the ever indispensable method of the dynamic sciences, the sciences of being. If indeed, along with a principle of conservation there is also one of contingent change, the abandonment of experiment is always dangerous and illegitimate. No longer is experiment a confused thought, a chronological starting-point of separate thought; no longer is it even the totality of the data amongst which induction discerns law, and which, once thus summed up in a general formula, render new observations ineffectual: it is the eternal source and rule of science, in so far as this latter would know things in truly objective fashion, *i.e.* in their history as well as in their nature, which, after all, is but one of their states. According to the doctrine of contingency, it is erroneous and chimerical to attempt to reduce history to a simple deduction.

From this point of view, the study of the history of beings is of singular importance. As it happens, instead of departing from the principle of things, as would be the case if their history were contained germinally in their nature and were but their analytical and necessary development, dynamic science unites itself with this principle, even more than does static science. It is act that explains essence, far more than essence can explain act. It is not, then, the nature of things that should be the final object of our scientific investigations, it is their history. Moreover, these two points of view differ unequally, according as the amount of contingency is

greater or smaller in the things to be known. And so, in the lower forms of being, history lies hidden beneath extreme stability. But as we take higher beings into consideration, essence appears less and less as something primordial ; it becomes more and more evident that it has its principle in the action of being itself. Man is the maker both of his character and of his destiny.

It is not scientific investigation, then, but simply the claim that one can finally dispense with experience, that is condemned by the doctrine of contingent variations ; we cannot have the reduction of the historic to the static sciences. Rather do the former become the truly concrete sciences, whereas the rest, in various degrees, are but abstract sciences.

In short, the doctrine of contingency adds a practical interest to an æsthetic and scientific one. Indeed, were it admitted that the existence of the world and the laws of succession manifested therein are absolutely necessary, freedom would appear to be an idea without an object. Perhaps the world, thus conceived, would still admit of development ; but as this development would be a system of modes necessarily linked to one another, it would not answer to the idea which the mind forms of freedom. Deduction, which develops for itself the consequences of a mathematical definition, is not a type of freedom but of necessity ; although this purely internal necessity is logically distinct from external necessity or fatality, strictly so called.

In order to find scope for freedom, without abandoning

the necessity of the laws of nature, would it be sufficient to consider the world given in experience as a pure phenomenon, in which being would in no way be involved ? Is it a matter of indifference to hand over to necessity, at such a cost, the world in which we are living ?

This doctrine is certainly less opposed to freedom than the former one, in which being was not really distinct from phenomena. As it posits an intelligible world apart from the sensible world ; as this world, which is that of being *per se*, is devoid of laws that have no meaning except when applied to phenomena, the doctrine in question would appear to set up in this higher world the very freedom it eliminates from the lower. In this way, freedom and necessity are mutually reconciled ; being is free in the absolute, and the order of its manifestations is necessary. As, moreover, there is no phenomenon given in experience which does not correspond to some act of being, we nowhere find necessity which is not added on to freedom. No doubt, from one aspect, everything is necessary, but from another, everything is free. More than this : as necessity is absolute, on the side of phenomena, so freedom is infinite, on the side of beings. In this reconciliation, then, neither freedom nor necessity is diminished.

Is it really possible so far to reconcile freedom with necessity ?

The sensible world being considered, according to this doctrine, as the phenomenon, symbol, expression of the intelligible world, the same necessity that links phenomena

together also links together the acts of being. Consequently, in a human life, there could be no one internal determination which would not necessarily be linked to all the rest. A single action determines the entire conduct. Each man's character, the series of his mental determinations, forms a system wherein appeal is made to each part by the whole. It would be wrong to say that such or such an action of ours is free; given our previous life, it can be no other than it is. That which is free is solely the creation of our character, or the system of inner acts exhibited by the network, so to speak, of our external feelings. Our freedom spends itself in a single act; its work is a whole no part of which can be changed. A strange doctrine, which regards change of life, amelioration or perversion, repentance, conquests of self, struggles between good and evil, as but the necessary events of a drama the issue of which has been decided upon beforehand!

But it is still a delusion to believe that, in this doctrine, the issue, at any rate, the general idea of our actions, remains under our control. If the suprasensible actions of each of us are necessarily linked to one another, they are linked in the same way to the suprasensible actions of other beings, the inner aspect of other phenomena. The same reasoning that sets up the necessary cor elation of all the determinations of one and the same will, sets up the necessary correlation of all the systems of voluntary determinations. Our personal character is an indispensable element of the intelligible

world ; it cannot be detached therefrom, cannot modify itself, without breaking the unity and harmony of the whole. In its existence and nature, the act which creates our moral life is an inevitable consequence of the acts of all other wills.

Moreover, it would be useless to allege that, even though we can make no change in the physical and psychological phenomena, at all events we can will them in such or such a spirit, and that, in this purely formal and metaphysical sense, our intentions remain free. This hypothesis would take away the entire purpose of the existence of the sensible world, since our intentions have only ideas for their object, and, from the point of view under consideration, the objectivity of these ideas would be indifferent to morality. Futhermore, this hypothesis, by refusing to the world of facts all possibility of expressing the moral side of actions, would in a way deprive it of the part it plays as a phenomenon of the metaphysical world, since the moral element is in all probability the essence of the metaphysical world, this very world itself. Hence this hypothesis would prevent us from making any moral judgment either on others or on ourselves. It would place morality in a sphere inaccessible to human consciousness. In a word, by removing from the will everything not previously comprised in the system of phenomena, it would regard its own perfection as consisting not in dominating things, but in conforming to them and making itself of no account.

Upon the whole, in this doctrine there is superposed

on a world of phenomena in which all things are necessarily linked together, a world of actions in which all things are also necessarily linked together. For particular beings, then, there can be no personal freedom. There exists nothing except a free being, and everything that is not this supreme being is absorbed in the system of its determinations.

But is this being itself really free ?

Undoubtedly it has been able to create or refrain from creating, to choose one world rather than another. And yet its choice has been subjected to the following restriction : that it must deal only with a world in which everything is linked together, in which everything is reduced to logical unity. Again, the act of this being is one and immutable ; it is forbidden to make any special intervention in the production of phenomena. Its very work is henceforth enjoined upon it as an inexorable fate.

The reason, then, that the doctrine of reconciliation admits of a limitless freedom, is that by setting it in regions so lofty, so far removed from things, its activity is lost in sheer emptiness.

Such are not the consequences of the doctrine of contingency. This doctrine does more than throw open to freedom, apart from the world, a field that is infinite, though void of objects which it can contact. It shatters the postulate which makes inconceivable the intervention of freedom in the field of phenomena, the maxim which states that nothing is ever lost and nothing created. It shows that this postulate, if admitted absolutely, would

bring into being a purely abstract science. Even in the details of the world, it reveals marks of creation and change. Thus it lends itself to the conception of a freedom coming down from suprasensible regions to mingle with phenomena and direct them along unforeseen paths.

Hence, freedom does not meet with the fate of the poet whom Plato crowned with a wreath of flowers, though he banished him from his Republic.

God is not only the creator of the world: He is also its providence and watches over the details as well as over the whole.

Mankind is not only possessed of a collective freedom: human societies also possess a freedom of their own; and within these societies even individuals dispose of their persons. In a word, the individual is not only the creator of his character, he can also intervene in the events of his life and change their course; every moment he can strengthen his acquired tendencies or endeavour to modify them.

In his relations with the world, man is not a spectator, compelled to maintain things just as they happen of necessity: he can act, set his stamp on matter, make use of the laws of nature to create works that transcend nature. His superiority over things is not a mere figure, an illusion born of ignorance, the barren consciousness of a higher value: it finds expression in an effective rule over other beings, in the power to mould them, more or less, according to and even by virtue of his ideas.

Hence, external acts, while they are not the whole of man and are not equivalent to the soul itself, that model which matter is incapable of imitating, may at all events be a manifestation, a more or less faithful interpretation of the intention of the will, and give experimental support to moral judgments. And, if the order of things can be modified contingently, in order to be good it will not be sufficient to have conceived, desired, and willed the good : it will be necessary to have acted, or anyhow tried to act ; for the moral consciousness regards possible good as obligatory.

Such are the metaphysical objects which the doctrine of contingency makes possible ; consequently, this doctrine would seem to be propitious to the beliefs of the human consciousness. Of itself, however, it is powerless to exalt these possibilities into realities, because freedom, which is its basis, and of which the contingency of things is here regarded as the outer sign, is not and cannot be, either directly or indirectly, given or set forth in experience. Experience apprehends only things actually realised. Now, we are here dealing with a creative power, prior to action.

And yet experience itself, by proving the contingent character of everything it brings within our knowledge and leaving this contingency unexplained, invites us to discover if there may not be some other source of knowledge, capable of supplying us with the reason of this contingency. By showing us that the different parts of the world, although contingent in their existence and

laws, manifest a certain order which gains in beauty what it loses in uniformity, experience suggests to us the superior nature of the beings revealed to our senses by their manifestations. Finally, as these superior beings, if their intervention is to explain the contingency of phenomena, must not live apart, without direct relation to the world of experience, or without intervening, more or less frequently, in the course of things, but must be the immediate authors of each phenomenon, devoid, in short, of all real dependence on concomitant phenomena, it is impossible to admit that knowledge of the world, as given by the senses and the understanding, *i.e.* knowledge of phenomena and laws, exclusive of generating causes, can ever be self-sufficient.

The senses show us changes but do not explain them. The understanding reveals to us the conservation of certain forms and modes of action through these changes, and explains the latter by the former. The purely relative character, however, of this permanence prevents us from seeing, in the forms and modes of action in which it is manifested, the principles of things themselves, *i.e.* of causes strictly so called, as well as of essences and laws. It appears to devolve upon metaphysics to fill up the void which the philosophy of nature has left, by trying to discover if it might not be possible for man to know, by some other path than that of experience, not essences and laws, but true causes endowed both with a faculty of change and with one of permanence.

To know things in the order of their creation, would be to know them in God; for a cause can only be recognised as such if connected by a link of participation to the first cause. If the series of causes has no limit there are no true causes; activity and passivity in all things have the same right of existence; the one no more than the other is the absolute foundation of being. But can the mind attain to this supreme essence?

It may be said that the positive sciences, through the study of phenomena, are even now seeking God, for they try to find the first principle of things. The various concepts to which we attempt to reduce all that is given in experience are, in a sense, nothing else than definitions of God.

It would be most rash, for the purpose of explaining the universe, to attempt to dispense with all postulates, and identify God with absolute necessity which presupposes nothing previous to itself. This idea, which after all is practically interchangeable with that of nonentity, is so meaningless that it explains nothing. We must resign ourselves to the introduction of an inexplicable principle in the idea of God; and this principle, if it is to be fertile, must be synthetical. In any case, we should like to reduce to a minimum what is taken for granted, and an attempt has been made to define God as "Being" or "the supreme genus." These concepts, however, though they do explain something, are still far too inadequate to explain the universe. We think we take the unfathomable sufficiently into consideration by

attributing to God, as irreducible elements, extension and force, *i.e.* by identifying Him with matter. But matter is still powerless to explain everything. To add to these attributes, as new postulates, the physical and chemical forces, human life and even human consciousness, is doubtless to obtain an increasingly wider idea of God, and therefore an increasingly fertile one ; but this is still not the conception of a God capable of explaining everything ; for the nature and laws of bodies, of living beings and of human consciousness, are not immutable and do not, of themselves, account for the changes which they admit. Are we to imagine, as final postulate, an irreducible synthesis which would comprise not only all the essential attributes of things known but also all those of things unknown and of things possible ? Such a synthesis would be an arbitrary conception, for there is no reason why there should be any term to the scale of attributes. The syntheses which, like those in which science culminates, are made up of the hierarchical organisation of a multiplicity, may be indefinitely complicated without ever reaching a final form. Besides, these formulæ will never explain everything, for they cannot be explained themselves, but are simply given or presented by observation and abstraction, and yet, as being complex and contingent, they call for explanation.

And so the positive sciences would attempt in vain to apprehend the divine essence or ultimate reason of things. This essence does not consist of a synthesis of attributes, however rich it is supposed to be. There

enters into the concept of perfection not only an idea of richness and plenitude, wherein it is infinitely far removed from indeterminate quantity, but also one of unity, completion, and absoluteness, wherein it is wholly distinct from the richest and most harmonious synthesis.

Neither experience, nor any logical elaboration of experience, could supply the true idea of God. But is the world, as given in experience, the whole of reality?

It is worthy of note that the concept of necessity or of absolute existence, which is, as it were, the form of the understanding, does not find its exact application in the given world, so that the understanding cannot govern science as it pleases, but must confine itself to conserving the sensations and their connections, without giving the character of absoluteness to the abstract principles and concepts resulting from this very conservation. Is it likely that the idea of necessity, inherent in the understanding, finds no legitimate application?

As we ascend the scale of beings, we see the development of a principle which, in a sense, resembles necessity: attraction for certain objects. The being would seem to be led necessarily. It is not, however, driven by something already realised, it is attracted by a thing not yet given, and one which, perhaps, never will be.

If we consider man, we find that he becomes acquainted with necessity in a form even farther removed from the conditions of experience: the form of desire. He feels simultaneously that he *should* act in a certain way and that he *can* act in another way.

Relations of this kind are scientifically unintelligible, and man would be led to consider them as illusions, born of ignorance, had he no other point of view, as regards things, than that of speculation. It would be rash, however, from this point of view, to attempt to comprehend all that is. The mode of knowledge should be suited to the object to be known ; and, just as, in order to see the sun, there is needed an organ which, as it were, holds light, in the same way, to know the relation between the sensible and the suprasensible, there is needed a faculty, for which both fact and idea, sign and thing signified, cease to be radically distinct. Man exhibits and becomes conscious of this faculty, when working for the realisation of an attractive or an obligatory idea. Action, imparting its own virtue to the intellect, introduces this latter to a higher world, of which the visible worlds were but the dead product. On the one hand, it reveals to the intellect the reality of power or of cause, as the creative and spontaneous principle which exists before, during, and after its manifestation. On the other hand, it shows the intellect that this power cannot pass over into action and be what it wills to be, unless connected, as with a principle of life and perfection, so to speak, with an end looked upon as necessary, *i.e.* as good, worthy to be pursued and realised.

The concept of necessity, then, acquires a real value, though in a new sense, if we regard the matter from the practical point of view. It even becomes possible to conceive the existence of an absolutely necessary object,

provided we admit, at the same time, the existence of an absolute freedom capable of realising it. Now, abandoning the external point of view where things appear as fixed and limited realities, so that we may fathom our deepest self and, if we can, apprehend our being in its true origin, we find that freedom is an infinite power. We are conscious of this power every time we truly act. Our actions do not, cannot realise it, and so we are not this power ourselves. It exists, nevertheless, since it is the root of our very being.

Thus, the understanding, by its category of necessity, is the middle term between the world and God : but we need a superior faculty to see in God something other than an ideal possibility and to give its true content to the abstract idea of necessity. This faculty we find in reason, or the practical knowledge of good. The moral life, in which it functions, appears to us with ever greater clearness—the more we force ourselves to practise it in all its purity and so become better acquainted with its essence —as the effort of the free being to realise an end which, in itself, absolutely merits realisation. But how can we help believing that this superior end, which imparts strength and light to him who seeks it, is not itself a reality, the first of realities ?

God is that being, of whose creative activity we are conscious deep within ourselves, in all our efforts to draw nearer to Him. He is the one perfect and necessary being.

In Him, power or freedom is infinite ; it is the spring

of His existence, which consequently is not subject to the constraint of fatality. Divine essence, co-eternal with power, is actual perfection. It is necessary with a practical necessity, *i.e.* it absolutely merits realisation, and can be itself only if realised freely. At the same time, it is immutable, because it is realised completely; and, in these conditions, a change could only mean a decline. In short, the state that results from this excellent and immutable act, the spontaneous product of infinite might, is one of changeless *felicity*.

No one of these three natures precedes the others. Each of them is absolute and primordial, and they form but one.

God is the creator of the essence and existence of beings. Moreover, it is His activity, His incessant providence, that gives the higher forms the faculty of employing the lower ones as instruments. Nor is there any reason to regard a special providence as more unworthy of Him than the creation of a manifold and changing universe?

The contingency shown in the hierarchy of the general laws and forms of the world finds its explanation in this doctrine of divine freedom.

And now, may not a knowledge of the first cause throw light on our knowledge of the lower beings?

Human nature, the higher form of the creature, is not without analogy with divine nature. In feeling, thought, and will, it possesses a sort of image or symbol of the three aspects of divinity. The lower beings, in their

nature and progress, successively recall the attributes of man after their own fashion. The whole world, then, would seem to be a rough imitation of divine being, a symbolical imitation, however, such as is involved in the essence of the finite.

Is not God the supremely good and beautiful? And, if the beings of nature offer some analogy with Him, does He not appear as their ideal, and not simply as their creative cause? Still, if each being in nature has thus an ideal, in accordance with which it is fashioned beforehand, though the ideal infinitely transcends it, must there not exist in each of these beings a spontaneous power greater than itself? Is it not in conformity with divine goodness to summon all beings, each according to its own dignity, to do that which is good, and also to instil in them that spontaneous activity which is the indispensable condition thereof?

The progress of the events of life may be likened unto a sea voyage. While the main concern of the sailors is to avoid hidden reefs and come safe out of storms, their efforts do not stop there. They have a goal to reach, and, however circuitous the routes they may have to traverse, they constantly aim for this goal. To advance is not to avoid, more or less completely, the dangers along the track, it is to draw nearer the goal. But though the sailors have a mission, they also have the freedom of action necessary for its accomplishment; and those whose duty it is more especially to steer the vessel are entrusted with greater authority. Of course the

power of these men is nothing compared with the might of the ocean ; but then, it is an intelligent and organised power ; it is put into action at the right moment. By means of a series of manœuvres and contrivances which do not appreciably change the outer conditions, but are all calculated to make use of them in view of the goal to be attained, man succeeds in making the winds and waves obey his will.

Similarly, it is not the sole end of the beings of nature to continue in existence, amid the obstacles surrounding them, and to yield to outer conditions : they have an ideal to realise ; and this ideal consists in drawing nearer to God, in resembling Him, each after its kind. The ideal varies with the different beings, since each has a special nature and is capable of imitating God only in and through its own distinctive nature.

The perfection for which creatures were born entitles them to a certain degree of spontaneity, necessary in order to transcend themselves. The higher the mission of a being, *i.e.* the more its nature admits of perfection, the wider is its liberty, the means of attaining its end. Nor is it necessary that these liberties should unsettle things in order that these latter may give them effective help. The world is so arranged that an imperceptible though appropriate intervention may turn into auxiliaries the most hostile of forces.

This doctrine, applied to the different forms of being, seems as though it would explain, to the entire exclusion

of chance, the contingency which may be manifested in their history.

There is for man an ideal, which the understanding determines by placing the idea of human nature in presence of the idea of God, and fashioning the former in the likeness of the latter ; not, of course, simply by a method of imitation but by one of interpretation, translation, symbolical equivalence ; for while the assigning of a limit to human perfectibility is unwarranted, on the other hand, it is contrary to the practical conditions of amelioration to attempt to reach the end without passing through all the intermediary stages, one by one.

The perfection of the will would be the goodness and love that reach the stage of self-sacrifice. The perfection of the intellect would be the complete knowledge that enables the course of things to be foreseen and controlled. The perfection of the sensibility would be the happiness that accompanies the intelligent and efficacious practice of love.

This ideal, the relation of which with the supreme end, *i.e.* with divine perfection, man clearly sees, thus appears to him as a binding object of pursuit. It is what he calls the good.

On the other hand, this same ideal, so far as it participates in human nature, which is an imperfect form, is not interchangeable with the good in itself ; it is but a symbol, a translation into the language of humanity ; it is a figure which has a meaning of itself, independently of the higher meaning it contains. From this second

point of view, the ideal is what is called the beautiful; it acts by attraction.

In order to accomplish obligatory good and follow after the lure of the beautiful, man is endowed with intelligent spontaneity, the highest form of which is free will or the power to choose between good and evil, between those actions that draw near to God and those that separate from Him. Owing to this power, man is able to influence the current of his desires, ideas, and induced states and transform them into ever higher wills, thoughts, and sources of satisfaction. Thus, too, he dominates nature, because his soul is capable of acting on his body and his body on matter. He consequently possesses both an inner and an outer freedom.

This free spontaneity, however, enamoured of its acts, so to speak, as though they at first realised the ideal, allows itself to be determined by them and is transformed into a habit. This metamorphosis is the product of metaphysical understanding, or the instinct of immutability, which, gazing upon the immutable essence of God, attributes the form of the absolute to that aspect of human operations which concerns the divine ideal. This would be a legitimate position, were the works of human spontaneity ever to show forth all the perfection of which they are capable, were the human ideal ever realised. Free spontaneity, however, in the conditions of the actual world, can do no more than increasingly approach this ideal. It never reaches the end of its task.

Human activity, nevertheless, more and more determined by the exclusive repetition of the same acts, gradually degenerates into a blind, inevitable, and uniform tendency, and produces phenomena whose order of succession is perceptibly constant. Seen from without, these phenomena appear to be nothing but the expression of a positive law or a necessary relation between objects of experience. We may then attempt to systematise and explain all man's acts, even those that come under the head of judgment and moral consciousness, without considering the existence of an intercurrent spontaneity. Statistics makes a legitimate invasion of the ground left abandoned by free will, and its conclusions are perceptibly confirmed by facts when it operates over wide areas, because the men who break through the thick layer of habit to awake and exert their free will are few in number compared with those who are swayed by habit. It is the former, however, who are really the rulers of the world: the mechanical activities of the many are but the reactions of the impulse which the few have initiated; this, in a word, is why we cannot find two historical periods exactly alike. The initial impulse, imperceptible during a period which it determines in every detail, is revealed to the observer who compares together systems that have sprung from different impulses. Those who simply go with the stream are vaguely conscious, deep within their soul, of a power to alter their course. If they attempt to exercise this power, its reality will become manifest to their consciousness; it will be so strengthened by the

very exercise as to produce effects that will baffle all reckoning. Heredity and instinct, character and habit cease to be absolutely inevitable laws when they are found, in essence, to be no more than the reaction of acts upon spontaneity. The very will that has created for itself a habit can modify it in order to rise higher, and also to descend again ; it can keep its habits active, so that they may become stepping-stones to higher development, just as it can also forget itself in passive habits which paralyse it more and more.

The uniformity of succession which characterises the psychological laws is thus but one phase of human activity. By increased energy, the soul can perfect its habits, its character, its inmost nature. It would deceive itself, however, if, in order thus to increase its freedom of action, it found its fixed centre solely in human nature or in the nature of the lower beings, if it had no other basis than love of self, or adaptation to unintelligent forces. The man who pursues nothing but his interests is the slave of his own nature. The man whose will is but the expression of outer influences is the slave of things. It is by going back to the source of freedom that man is able to increase his own freedom. Now, this source is perfection, a practical end which demands a free agent. And so, after all, it is by finding his fixed centre above himself, in the idea of the end for which he was born, that man will be able to rule both his own nature and the world in which he lives.

But this end set before human nature is not a simple

idea, of which man has no visible expression before his eyes. It finds a beginning of its realisation in organised societies, wherein laws, custom, and public sentiment bestow honour upon virtue and cast a stigma upon moral abasement. It is by living for society, then, and connecting himself with it, that man, in practical life, can develop and increase his freedom. Society is the visible foundation of human freedom.

There are two ways, however, of comprehending the social bond. It may be a purely external bond, founded on mutual distrust and on more or less learned combinations: in this case, the social form possesses rather a coercive than an educative influence. But it may also be an internal and direct bond between wills themselves, a reciprocity of confidence and devotion. Now, it is more particularly when thus realised that the social form is capable of contributing powerfully to the moral improvement of man. Do we not find that example, by appealing direct to the will and neglecting the reason, acts far more surely and convincingly than the most conclusive of proofs? Life cannot be a product of mechanical forces.

Spontaneously subordinated to society, human freedom effectively works on nature and the soul. It represses those egoistic passions which take away a man's self-possession. It co-ordinates the desires and thoughts, between which an inner struggle would rage, were not an end, higher than individual good, set before them. Man is conscious of becoming better when he works for the good of his fellow-beings. At the same time,

his dominion over nature increases. By convergence of effort and by science, man increasingly transforms obstacles into instruments; and, whilst doing so, he attributes new beauties to these lower beings. Whilst powerless to create forces analogous to those of nature, he is able, by a series of mysterious operations, the possibility of which is doubtless connected with the inner analogy of beings, to extend right into matter the aspiration of his soul towards the ideal, and, not only to bring about a reconciliation between the lower beings and himself, but also to awaken in them such a degree of progress as nature could not have effected.

Now, from the distinctively human standpoint of improvement, man needs to possess such dominion over the world. The influence of the body and of external things upon his affections, desires, and thoughts is so profound, that he really modifies his moral nature only by the aid of these lower forces. He must recede from condition to condition and modify psychological phenomena, some by chemical and physical, others by mechanical phenomena: the work of regeneration will be all the more permanent if it be set up on stronger foundations. For instance, if we would check a flood, we do not simply protect the threatened plains by means of dykes, we go back to the very source of the stream and divert its course.

The human race is powerful when displaying the faculty of union and harmony, of moral and spontaneous hierarchy with which it is endowed in superior measure.

Power appertains to the union of soul with soul. It is because the living world, apparently so frail, possesses, in organisation, an *ébauche*, so to speak, of this harmony, that it bends to its own purposes the inorganic world, over which reign uniformity, division, and isolation. And, in the human person, it is because the psychic powers are reduced to unity by consciousness that the soul is mistress of the body, in which each organ aspires after a separate life. It is because the will is subordinated to an end, which in turn communicates to it its own unity, that it is able to rule over the passions, each of which would fain absorb all the forces of the soul, and which, consequently, oppose and weaken one another. In short, it is because society is a moral hierarchy and so possesses superior unity, that it is capable of extending the power of man and of increasing indefinitely, so to speak, his rule over things and over himself.

And, while man is powerful by means of society which co-ordinates his forces, on the other hand, the more he isolates himself, devoting his life to a lower object, the less becomes his inner and outer freedom. In the depths of his own nature he encounters passions which sway him in every direction and which he has no longer the power to overcome. Important aids so long as they were kept in subordination, they reduce man to a state of powerlessness when they struggle to obtain possession of him. Human nature bears within itself the signs of a higher destination or purpose than the individual life. Similarly, the isolated individual is

powerless in the presence of nature. This latter regains its sway, once man abdicates the privilege of a loftier harmony which had raised him above nature.

If man really possesses in free will an image of divine freedom, we cannot wonder that the order of psychological phenomena shows some degree of contingency. The contingent element is the exterior effect of progress or of moral decadence, of the intervention of freedom for the purpose of modifying a habit, whether good or bad. The fixed laws, on the other hand, are the expression of whatsoever element the soul has passed on to habit.

Is the doctrine of spontaneity, so plausible in things that concern man, inapplicable to beings devoid of consciousness ?

Undoubtedly these beings cannot possess that higher form of spontaneity which is called free will, and which consists in pursuing distant ends, whilst conscious, at the moment of making one decision, of the power to make some other. Undoubtedly also it is impossible to assign how far spontaneity may distinctively be attributed to them, and how far it differs from the creative activity of God. But then, on the other hand, would the lower beings really be beings at all, if they existed only as phenomena ; if they were nothing in themselves ? When we find in ourselves that the physiological and physical phenomena correspond to inner activities not wholly devoid of analogy with our own soul, since they either help or thwart it, why not admit the existence of an inner power wherever we see a phenomenon ?

The lower forms are, like man, susceptible of improvement, to a certain extent at least. They also have an ideal : that of resembling, in their own way, the higher forms ; in a word, of resembling God Himself. How can nature and mountains, sea and sky, resemble man ? Poets know that they do, and so they translate into human language the mysterious harmonies of things. Moreover, it is not by effecting a metamorphosis, by changing their nature, that the lower beings can thus express increasingly lofty ideas. The radical metamorphosis of a natural kingdom would be such a revolution as would deprive the universe of one of its ornaments, one of its pillars, so to speak. Besides, instead of becoming more beautiful, a lower being becomes more ugly when it imitates the aspect of a higher one without interpreting it according to its own powers. The symbol is an object of admiration only if its form is natural, as well as expressive. Thus, there is a particular ideal for every being in nature.

In the descending series of the lower forms, the ideal, or degree of perfection compatible with the nature of beings, becomes farther and farther removed from absolute perfection, and therefore its realisation appears less and less indispensable ; hence, it is no longer the obligatory good, it is the beautiful, a symbol whose mysterious meaning becomes increasingly lost, whose visible side develops, and which, consequently, exercises an ever more immediate attraction.

Because beings of every stage have an ideal to pursue,

there must exist in all of them a degree of spontaneity, a power of change, proportioned to the nature and value of this ideal. The spontaneity of the lower beings, however, blind and incapable of mediate tendencies, undergoes, far more than does that of man, the reaction from the very changes it generates ; it is determined, limited, absorbed in things to an extent of which human habit gives but a faint idea. Animal instinct, life, physical and mechanical forces are, as it were, habits that have penetrated more and more deeply into the spontaneity of being. Hence, these habits have become almost unconquerable. Seen from without, they appear as necessary laws. Still, this fatality is not of the essence of being ; it is accidental to it. This is why the intervention of the higher spontaneities, or perhaps the direct influence of the ideal, is capable of drawing out of their state of torpor the most imperfect of creatures, and arousing their power of action.

On the one hand, then, there is for all beings an ideal, a model, perfect of its kind, which the understanding adjusts, transfiguring the natural essences by the aid of a divine ray ; on the other hand, there is in all beings a spontaneity adapted to the pursuit of this ideal.

In every department of being, then, essences and laws present two aspects.

In the physiological world, life cannot be reduced to a number of observable functions. At bottom, it is an inner power, tending to produce, within the heart of each species, the forms not only most useful to the

beings themselves but also the most beautiful of which that particular species admits.

In the physical world, properties are the true potentialities of a change of state, of combination and decomposition, tending to produce not only the most permanent, but also the most beautiful forms that the nature of the bodies will allow.

In the mechanical world, force is not only the expression of relations observable between movements, it is also a practical potentiality, tending to produce the beautiful by translating it into the language of extension, figure, symmetry, and motion.

Thus, the principles of physiology, physics, and mathematics have manifestly not only a material sense and an origin *a posteriori* ; they have also an æsthetic sense, and from this point of view an origin *a priori*.

In short, it may be that spontaneity is not wholly absent even in the abstract forms of being.

Logical order, or the subordination of facts to notion, holds concealed, it may be, the spontaneous activity of inner reason or the final cause, the notion or conception of which is only the logical sign. Individuals thus have their reason for existence in the species. Although relatively motionless, type, or the final cause, possesses the spontaneity necessary for the pursuit of the most beautiful forms. Hence, the experimental logical laws are, after all, based upon æsthetic principles *a priori*.

Similarly, ontological order, or the causal relationship of phenomena, hold concealed the veritable causes or

metaphysical powers which produce the changes of the world. And these elementary powers, almost identical with fatality, since they are, as it were, the habit of being upon which all other powers are based, none the less retain in their inmost essence a remnant of spontaneity, the object of which is to produce the utmost possible with the fewest materials, to create effects transcending their external conditions, their phenomenal cause. Thus the principle of causality, also, has an æsthetic sense, and, from this point of view, an origin *a priori*.

The idea of necessity is, at bottom, the translation, into as abstract logical language as possible, of the activity exercised by the ideal upon things, by God upon His creatures. This is the most material symbol of moral obligation and æsthetic attraction, *i.e.* of necessity assented to and experienced. It is the term or goal where the sensible sign, no longer expressing anything but itself, ends by disappearing and becoming identified with absolute nonentity. And, in this sense, the idea of necessity, also, is a principle posited *a priori*.

And so metaphysics might set up a doctrine of freedom on the ground prepared by the doctrine of contingency. According to this doctrine, the final principles of things are still laws, though moral and æsthetic laws, more or less immediate expressions of divine perfection, existing previous to phenomena and presupposing agents endowed with spontaneity: that is, practical good, or the ideal, which merits realisation, and yet is capable of not being realised, is indeed realised only when it happens spontan-

eously. The laws of nature have no absolute existence ; they simply express a given phase, a stage, a moral and æsthetic degree of things, so to speak. They are the image, artificially obtained and determined, of a model that, in essence, is living and movable. The apparent constancy of these laws finds its reason in the stability inherent in the ideal itself. One might say that the being tends to remain stationary in the form it has once assumed, because it first sees this form under that aspect which participates of the ideal : it takes delight in the form and tends to continue in it. This is what in man is called habit. Now, habit, a divine grace when active and regarded as a stage enabling one to rise still higher, becomes a cause of weakness, of dissipation of energy, and of decay, when regarded as an ultimate term, when it is passive. The more deep-rooted and passive when the ideal is less mediate and lofty, habit successively expresses itself by faculties, instincts, properties, and forces. It gives the lower beings the appearance of a series of lifeless laws. Habit, however, is not the substitution of a substantial fatality for spontaneity : it is a state of spontaneity itself. This latter then remains, under the laws to which it appears subject ; it may continue sensitive to the attraction of superior goodness and beauty. At every stage, spontaneity may unite itself with its ideal and perfect its own nature. In attachment to this ideal it finds a superabundance of energy, enabling it to collect together the elements scattered broadcast by passive habit and to organise them with a view to new

conquests. In proportion as beings thus cease to live solely for themselves, and as the subordination of the lower being to the higher, the inner adaptation of the conditions to the conditioned, of matter to form, becomes more spontaneous and complete : in like proportion do we find a diminution, throughout the world, of uniformity, homogeneity, and equality, *i.e.* of the undisputed sway of physical fatality. The complete triumph of the good and the beautiful would do away with the laws of nature, strictly so called, and would replace them by the free flight of human wills towards perfection, by the untrammelled hierarchy of souls.

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